

ANALYSIS OF
DRAFT ENVIRONMENTAL IMPACT STATEMENT
FOR
PROPOSED 1975 OUTER CONTINENTAL SHELF
OIL AND GAS LEASE SALE OFFSHORE SOUTHERN CALIFORNIA
(O.C.S. Sale No. 35)

Presented on Behalf of the Southern California
Council of Local Governments Concerned With the
Federal Proposal for Accelerated O.C.S. Oil and
Gas Development Nationwide and in Southern
California

by

INSTITUTE OF GOVERNMENTAL
STUDIES LIBRARY

JAN 28 1977

UNIVERSITY OF CALIFORNIA

TOM BRADLEY, Mayor

BURT PINES, City Attorney

Staff:

Norman Emerson

Graham Smith

Staff:

Jan Chatten-Brown

Gail Gordon

Ginger Lew

John McDermott

Patricia Smith

ANALYSIS OF
DRAFT ENVIRONMENTAL IMPACT STATEMENT
FOR
PROPOSED 1975 OUTER CONTINENTAL SHELF
OIL AND GAS LEASE SALE OFFSHORE SOUTHERN CALIFORNIA
(O.C.S. Sale No. 35)

Presented on Behalf of the Southern California
Council of Local Governments Concerned With the
Federal Proposal for Accelerated O.C.S. Oil and
Gas Development Nationwide and in Southern
California

by

TOM BRADLEY, Mayor

BURT PINES, City Attorney

Staff:

Norman Emerson

Graham Smith

Staff:

Jan Chatten-Brown

Gail Gordon

Ginger Lew

John McDermott

Patricia Smith

77 01439

INSTITUTE OF GOVERNMENTAL STUDIES LIBRARY
109 PHILOSOPHY HALL
UNIVERSITY OF CALIFORNIA
BERKELEY, CA 94720

THE SOUTHERN CALIFORNIA COUNCIL OF LOCAL
GOVERNMENTS CONCERNED WITH THE FEDERAL
GOVERNMENT'S PROPOSAL FOR ACCELERATED O.C.S.
OIL AND GAS DEVELOPMENT NATIONWIDE AND IN
SOUTHERN CALIFORNIA

The Southern California Council of Local Governments Concerned with the Federal Proposal for Accelerated O.C.S. Oil and Gas Development was formed by a group of Mayors, Councilpersons and other governmental officials. The purpose of this Council was to discuss the proposals of the Department of Interior in regard to expanded O.C.S. development nationwide and in Southern California.

The members of the Council include:

- City of Los Angeles
- City of San Diego
- County of San Diego
- City of Beverly Hills
- City of Santa Monica
- City of Santa Barbara
- County of Santa Barbara
- City of Riverside
- City of Newport Beach
- City of Torrance
- City of Palos Verdes Estates
- City of Rancho Palos Verdes

City of Laguna Beach

County of Orange

City of Huntington Beach

Southern California Association of
Governments

Due to the press of time, this Analysis could not be fully circulated to all members of the Council to receive formal ratification.

TABLE OF CONTENTS

PART ONE:

LEGAL ANALYSIS

	<u>Page</u>
I SUMMARY	2
II REQUIREMENTS FOR A LEGALLY ADEQUATE E.I.S.	10
III PREMATURITY OF SOUTHERN CALIFORNIA O.C.S. ENVIRONMENTAL REVIEW PROCESS	19
IV INADEQUACIES OF THE E.I.S.	37
A. ISSUES AFFECTING BOTH NATIONWIDE AND SOUTHERN CALIFORNIA NOT DEALT WITH ADEQUATELY IN EITHER E.I.S.	37
B. ENVIRONMENTAL IMPACT OF SOUTHERN CALIFORNIA O.C.S. LEASING	41
1. Lack of Sufficient Information	41
2. Failure to Measure Cumulative Impacts	48
3. Need for Regional Analyses of Five Distinct Areas	50
4. Need for Further Study	51
C. UNAVOIDABLE ADVERSE IMPACTS	53
1. Oil Spills - Environmental and Economic Effects	53
2. Onshore Land Use Impacts	62
3. Degradation of Air Quality	65
4. Economic Losses to Local Governments	71

Table of Contents (Cont'd)

Page

D. ALTERNATIVES INADEQUATELY CONSIDERED	76
1. The Alternative of Conservation	76
2. Alternative Energy Sources	80
3. Splitting Exploration and Production	84
E. MITIGATION MEASURES NOT FULLY CONSIDERED	86
1. No Nearshore Drilling	86
2. Economic Guarantees to Local Governments	94
3. Improved Drilling Regulations and Containment Capability	94
F. CONCLUSION	101

PART TWO:

SCIENTIFIC ADVISORY COMMITTEE REPORTS

MEMBERS OF THE SCIENTIFIC ADVISORY COMMITTEE	105
I AIR QUALITY	106
Dr. Richard L. Perrine	106
Dr. James N. Pitts, Jr. and Dr. Barbara J. Finlayson	114
II CHEMICAL OCEANOGRAPHY	132
Dr. I. R. Kaplan	132
III SEISMICITY	139
Dr. James H. Whitcomb	139

Table of Contents (Cont'd)

Page

IV	MARINE BIOLOGY	164
	Dr. Malcolm S. Gordon	164
	Dr. J. T. Enright	173
V	MARINE BOTONY	187
	Dr. David J. Chapman	187



Digitized by the Internet Archive
in 2025 with funding from
State of California and California State Library

<https://archive.org/details/C123319905>

PART ONE:

LEGAL ANALYSIS

I. SUMMARY

The following is a summary of the detailed analysis of the tract specific draft E.I.S. for Southern California O.C.S. development. This analysis has been prepared by and on behalf of the Council of Local Governments Concerned with O.C.S. Development, for presentation to B.L.M. as a portion of the comment and input to be given by the participating jurisdictions during the public hearing and review process.

The Analysis contains not only a review of the tract E.I.S. by the participating public entities, but also a critique of various technical aspects of the document prepared by the Scientific Advisory Committee. This Committee was formed at the request of the Council to advise the participating jurisdictions as to the accuracy of the data included in the E.I.S., the additional data which should be provided, the additional scientific studies which should be undertaken, and related matters.

Below is a short review of the matters contained in the legal analysis.

Requirements for a Legally Adequate E.I.S.

The National Environmental Policy Act of 1969 (NEPA) sets forth specific requirements for the timing and contents of an environmental impact statement. Case law establishes that under NEPA federal agencies have a duty to give full good faith consideration to environmental values in decision-making. Indeed, the procedural requirements of NEPA are subject to a strict standard of compliance. Measured against these standards, the tract specific draft E.I.S. for Southern California O.C.S. leasing is legally deficient in the following ways:

1. It was released (and the review process initiated) before completion of a final, legally adequate, program E.I.S. on accelerated leasing nationwide and a decision to go forward with the national program is made.

2. It reflects a failure on the part of Interior to develop the data on marine resources necessary to an intelligent analysis of the impact of O.C.S. development, or to conduct appropriate research to provide more definitive answers about critical "unknowns" about those impacts.

3. Fully consider and discuss in sufficient detail the primary, secondary and cumulative effects of O.C.S. development, supported by empirical data or scientific authorities.

4. Fully consider and discuss alternatives to the proposed action and measures to mitigate its impact.

5. Address the numerous other major issues discussed in this analysis.

Prematurity of Environmental Review Process for Southern California O.C.S. Leasing

The tract specific draft of E.I.S. for Southern California offshore oil and gas leasing was prepared and issued in advance of two critical stages in the decisional process: (1) the completion of a final programmatic E.I.S. on O.C.S. development nationwide containing all relevant comment on the environmental effects of the proposal and (2) a decision on whether to lease nationwide and if so, when, where, and according to what safeguards. The tract document is legally insufficient per se in its present form because it fails to consider the environmental information contained in the yet to be released final program E.I.S. or the character of any decision to lease.

O.C.S. Issues Not Adequately Covered in Either the Draft
Program E.I.S. or Draft Tract E.I.S.

Several issues relevant to the impact of expanded O.C.S. development nationwide and equally applicable to Southern California O.C.S. leasing have not been adequately discussed in either the draft program E.I.S. or the draft tract E.I.S. Among these issues are the following:

1. Need for a coherent national energy policy.
2. Discussion of relative environmental impacts of O.C.S. development nationwide and in Southern California.
3. Degradation of air quality.
4. Onshore land use impacts.
5. Economic losses to local governments as a result of oil spills and need for increased municipal services to support onshore activities.
6. Coordination with California Coastal Zone Conservation Commission.

Until these issues are adequately discussed in one document or the other, the environmental review process for Southern California leasing will not be in compliance with NEPA.

Lack of Sufficient Information About the Environmental Impacts of Southern California O.C.S. Leasing

There are many "unknowns" regarding the environmental impacts of O.C.S. development. No adequate baseline information has yet been developed with which an intelligent and reasoned analysis of the effects of O.C.S. development can be made. There is a lack of information about the long-term effects of oil pollution on the marine ecosystem, the possible carcinogenic effects of such pollution and the uptake of pollution and carcinogens in the marine food chain. There is a lack of information on the amount of time necessary for biological recovery after an oil spill, a matter of great concern in view of the fact that Interior concedes in its high case estimates the possibility of oil spillage every year in an amount equivalent to the Santa Barbara spill. The tract E.I.S. also fails to consider the cumulative impacts of all energy related development in Southern California. Finally, there appears to be a need for separate consideration of the five, geographically and environmentally dissimilar, regions proposed for leasing in Southern California. NEPA and case law interpreting NEPA require that additional research and study be done to fill in the information gaps on the environmental consequences of O.C.S. development.

Unavoidable Adverse Impacts

The tract E.I.S. fails in several respects to give a complete and thorough discussion of the unavoidable adverse impacts of O.C.S. development offshore Southern California. Little attention is given to the Santa Barbara experience in considering the awesome environmental and economic consequences of a major oil spill. This is a particularly serious omission in view of the fact that Interior postulates, in its high case estimates the equivalent of one Santa Barbara spill per year. Almost no consideration was given to the degradation of air quality which will occur, particularly as a result of increased refinery activity. Neither is there a full discussion of onshore land use impacts or of economic losses that will be suffered by local governments from oil spills and increased municipal services to support onshore related activities.

Alternatives Inadequately Considered

Another defect in the tract E.I.S. is its failure to adequately discuss alternatives to the proposed action. Although everyone agrees on the importance of energy conservation, Interior has yet to discuss it in concrete terms. In our analysis of the program E.I.S., we presented an elaborate conservation proposal as an alternative to O.C.S. development.

We urge Interior to give that proposal serious consideration. We also urge that Interior provide a more adequate treatment of other energy alternatives and the possibility of splitting exploration from production.

Mitigation Measures Not Fully Considered

An extremely important mitigation measure not discussed at all in the tract E.I.S. is a moratorium on all development in nearshore waters such as Santa Monica Bay. Drilling would occur in outer areas first, with nearshore drilling permitted, if at all, only when more complete information about the effects of offshore drilling is developed. Instead, Interior plans to lease first in nearshore waters, despite the risk to the extensive recreational and commercial use of the Southern California coastline, particularly in the Los Angeles-South Bay area. We urge that the leasing schedule be reversed, with outer areas leased first. We also urge that economic guarantees be made to local governments and other interested parties prior to any lease sale in order to offset the cost of oil spills and increased municipal services. Finally, we recommend that consideration be given to improved drilling regulations and containment mobilization capability.

Conclusion

For the reasons above, we conclude that the tract specific draft E.I.S. for Southern California O.C.S. leasing does not meet NEPA's strict standards of compliance. We request that an additional opportunity for review and comment on the E.I.S. for Southern California leasing after release of a final, legally adequate, program E.I.S. and a decision to go forward with that program. We recommend that baseline studies be completed and that further research be done on the "unknowns" in connection with the impacts of oil pollution on marine ecosystems. Finally, we urge that a new draft tract specific E.I.S. be issued which addresses more fully the issues raised herein. Only then will the mandates of NEPA be satisfied.

II. THE REQUIREMENTS FOR A LEGALLY ADEQUATE E.I.S.

The National Environmental Policy Act of 1969 (NEPA), 42 U.S.C. § 4321 et seq., establishes a national environmental policy whereby it is the continuing responsibility of all federal agencies to use "all practicable means and measures . . . to create and maintain conditions under which man and nature can exist in productive harmony." In order to implement that policy, the Act contains important procedural requirements which are designed to ensure that all federal agencies give full consideration to environmental values in their decision-making processes.

1. The Duty to Consider Environmental Factors

Section 102(2) (B) requires all agencies of the federal government to:

" . . . identify and develop methods and procedures . . . which will insure that presently unquantified environmental amenities and values may be given appropriate consideration in decisionmaking along with economic and technical consideration." 42 U.S.C. § 4332(2) (B). (Emphasis supplied.)

To implement this duty to consider environmental factors, §102(2) (C) requires that "to the fullest extent possible" all federal agencies must prepare a detailed environmental impact statement in connection with "major federal actions significantly affecting the quality of the human environment." 42 U.S.C. §4332(2) (C). The E.I.S. must discuss.:

- (i) The environmental impact of the proposed action,
- (ii) any adverse environmental effects which cannot be avoided should the proposal be implemented,
- (iii) alternatives to the proposed action,
- (iv) the relationship between local short-term uses of man's environment and the maintenance and enhancement of long-term productivity, and
- (v) any irreversible and irretrievable commitments of resources which would be involved in the proposed action should it be implemented.

42 U.S.C. §4332(2) (C).

CEQ guidelines further provide that the statement must consider the cumulative impacts of proposed agency actions. 40 C.F.R. § 1500.8(a) (1).

Prior to making a detailed statement, moreover, a federal agency must consult with and obtain the comments of other federal agencies affected by the action. Once a draft impact statement is prepared, it must be circulated to all appropriate federal, state and local agencies for review and comment. All comments must be incorporated into a final statement which is then to "accompany the proposal through the existing agency review processes." 42 U.S.C. § 4332(2) (C). Section 102(2) (C) is NEPA's most important procedural requirement in that it compels the development of a record from which it can be determined whether environmental factors have in fact been considered in the agency decisionmaking process.

NEPA case law firmly establishes the importance of the duty, embodied in § 102(2)(C), to consider environmental factors in agency review processes. In Calvert Cliffs' Coordinating Committee v. United States AEC, 449 F.2d 1109 (D.C. Cir.1971), that duty was given its definitive judicial gloss. Reviewing AEC hearing board guidelines that did not require hearing officers to consider environmental factors in licensing nuclear facilities, Judge J. Skelly Wright ruled that the purpose of §102(2)(C) was to require agencies to consider environmental values:

The question here is . . . whether it is enough that environmental data and evaluations merely "accompany" an application through the review process, but receive no consideration whatever from the hearing board.

We believe that the Commission's crabbed interpretation of NEPA makes a mockery of the Act. What possible purpose could there be in the § 102(2)(C) requirement (that the "detailed statement" accompany proposals through agency review processes) if "accompany" means no more than physical act of passing certain folders and papers, unopened to reviewing officials along with other folders and papers? . . . The word "accompany" in § 102(2)(C) must not be read so narrowly as to make the Act ludicrous. It must, rather, be read to indicate a congressional intent that environmental factors, as compiled in the "detailed statement", be considered through agency review processes. 449 F. 2d at 1117,1118.

Calvert Cliffs, which is regarded as the leading case on the duty to consider environmental factors in agency decisionmaking, establishes that compliance with § 102(2)(C) must "amount to full good faith consideration of the environment" and "if a decision is

reached without consideration of environmental factors - conducted fully and in good faith - it is the responsibility of the courts to reverse." 449 F. 2d at 1113, 1115.

CEQ guidelines interpreting NEPA also confirm the duty of all federal agencies to consider environmental factors in agency decisionmaking. The guidelines require agencies "to build into their decisionmaking process, beginning at the earliest possible point, an appropriate and careful consideration of the environmental aspects of proposed action in order that adverse environmental effects may be avoided or minimized and environmental quality previously lost may be restored." 40 C.F.R. § 1500.1(a). (Emphasis supplied.) CEQ policy with respect to environmental impact statements is that all federal agencies shall:

- (1) Provide for circulation of draft environmental statements to other Federal, State and local agencies and for their availability to the public in accordance with the provisions of these guidelines;
- (2) Consider the comments of the agencies and the public;
- (3) Issue final environmental impact statements responsive to the comments received. 40 C.F.R. § 1500.2(b). (Emphasis supplied.)

CEQ guidelines, in short, mandate all federal agencies, in the preparation and circulation of environmental impact statements, to identify and discuss all existing opinion on the environmental effects of proposed administrative action, to consider those

opinions and to have those opinions accompany the agency proposal through its existing review processes.

2. The Standard of Strict Compliance

Judicial interpretation of NEPA has firmly established that its procedural requirements "are not highly flexible," but rather "establish a strict standard of compliance." Calvert Cliffs, supra, at 1112. The Calvert Cliffs case, in a holding adopted by courts too numerous to mention (see, e.g., National Helium Corp v. Morton, 455 F.2d 650 (10th Cir. 1971); Daly v. Volpe, 350 F. Supp. 252 (W.D. Wash. 1972)), established a rigorous standard for compliance with § 102(2) (C):

Of course, all of the §102 duties are qualified by the phrase "to the fullest extent possible." We must stress as forcefully as possible that this language does not provide an escape hatch for footdragging agencies; it does not make NEPA's procedural requirements somehow "discretionary". Congress did not intend the Act to be such a paper tiger. Indeed, the requirement of environmental consideration "to the fullest extent possible" sets a high standard for the agencies, a standard which must be rigorously enforced by the reviewing courts.

Thus, the §102 duties are not inherently flexible. They must be complied with to the fullest extent, unless there is a clear conflict of statutory authority. Considerations of administrative difficulty, delay or economic cost will not suffice to strip the section of its fundamental importance. 449 F.2d at 1114, 1115.

The purpose of NEPA's procedural requirements, particularly the §102(2) (C) impact statement process, is to guarantee that environmental values are fully considered in administrative

decisionmaking. Compliance "to the fullest extent possible" effectuates that purpose. Thus, "the procedural duties, the duties to give full consideration to environmental protection, are subject to a . . . strict standard of compliance." 449 F2d at 1128. Any failure by Interior to comply with NEPA procedural requirements must be measured against that standard.

3. Legal Sufficiency of Draft Tract Specific E.I.S.

Measured against the standard of strict compliance, we believe that the draft tract specific E.I.S. for Southern California O.C.S. leasing is legally deficient in several respects. First, we note that the tract E.I.S. and the entire review process for Southern California O.C.S. leasing are illegal per se because they are occurring before the release of a final program E.I.S. on expanded nationwide leasing and prior to any decision about that expanded lease proposal. This problem is discussed in detail below.

Next, we set forth in this analysis several major impacts of O.C.S. development in Southern California which have been inadequately discussed or omitted altogether. These issues include the need for a coherent national energy policy, relative environmental impacts nationwide, degradation of air quality, onshore land use impacts, economic losses to local governments, and economic and environmental effects of oil spills. Cases interpreting NEPA have evaluated the adequacy of impact statements

and found them legally inadequate for want of sufficient detail. In Environmental Defense Fund v. Corps of Engineers, 325 F. Supp. 728, 759 (E.D. Ark. 1971), aff'd, 478 F.2d 289 (8th Cir.1972), the court turned to the dictionary definition of "detail" and concluded, "Necessarily, the E.I.S. must be 'marked by abundant detail or thoroughness in treating small items or parts.'" And in Silva v. Lynn, 482 F.2d 1282, at 1287(1973), the First Circuit commented, "A conclusory statement 'unsupported by empirical data, scientific authorities, explanatory information of any kind' (citation omitted) not only fails to crystallize issues but 'affords no basis for a comparison of the problems involved and the alternatives.)" Similarly, in this case critical environmental impacts of O.C.S. development have been insufficiently discussed; these deficiencies must be remedied in the final statement.

Further, the tract specific draft E.I.S. reveals that there are significant "unknowns" about the impact of O.C.S. development in Southern California. There exists no baseline data with which to evaluate the impact of O.C.S. development. Scientists have yet to fully examine the long term effects of oil spills on marine life, their possible carcinogenic effects, and uptake of pollution into the marine food chain. Scientists do not know the cumulative effect of repeated or continuous spillage without a sufficient period for biological recovery. There is a need to consider the cumulative impacts of all energy related developments in Southern California. There is a need

to consider separately five distinct regional areas of the Southern California O.C.S. Interior cannot rely on the absence of data regarding these matters to conclude that a resource may not be impacted. There is an affirmative obligation upon federal agencies to develop the missing data. As the court ruled in E.D.F. v. Hardin, 325 F. Supp. 1401 at 1402 (D.C.D.C. 1971), NEPA "makes the completion of an adequate research program a prerequisite to agency action. The adequacy of the research should be judged in light of the scope of the proposed program and to the extent to which existing knowledge raises the possibility of potential adverse environmental effect." And in Lathan v Volpe, 350 F. Supp. 262, 265 (W.D. Wash. 1972), the court held, "The proper response to comments which are both relevant and reasonable is to either conduct the research necessary to provide satisfactory answers, or to refer to those places in the impact statement which provided them." Further research and study, then, is required to provide more definitive answers to the significant "unknowns" about the environmental impacts of O.C.S. leasing.

Finally, the draft tract E.I.S. fails to fully consider the viability of other alternatives to O.C.S. development or measures to mitigate its impact. Other alternatives include conservation, other energy sources, and splitting exploration from production. Mitigation measures inadequately considered include no nearshore drilling, economic guarantees to local governments, and improved drilling regulations and containment capability. N.R.D.C. v. Morton, 458 F. 2d 827, 839 (D.C.Cir.

1972), specifically addressed the need to discuss energy alternatives to O.C.S. development, "what is required is information sufficient to permit reasoned choice of alternatives so far as environmental aspects are concerned." Accord, Monroe County Conservation Council v. Volpe, 472 F.2d 963, 967(2d Cir. 1972).

For the reasons above, we believe that the tract specific draft E.I.S. for Southern California is legally inadequate. We urge that an opportunity for review of the tract proposal be provided after release of the program E.I.S. and a decision is made on nationwide leasing. We recommend that further research and study be done to fill our critical information gaps on the impacts of O.C.S. development. We suggest that further consideration be given to the economic effects of leasing that result from oil spills and need for increased municipal services, and that such consideration be done before any lease sale. Finally, we urge that a new tract specific draft E.I.S. be released curative of its present inadequacies. Until these things are done, compliance with NEPA will not have been achieved.

III. PREMATURITY OF ENVIRONMENTAL REVIEW PROCESS FOR SOUTHERN CALIFORNIA OCS LEASING

The Interior Department has yet to complete a final programmatic E.I.S. on its proposed nationwide expanded O.C.S. oil and gas leasing program. Only then will a decision be made whether to lease on the O.C.S. at all, and, if so, when, where, and according to what safeguards. Nonetheless, Interior has chosen to proceed with tract or site specific O.C.S. activities in Southern California and elsewhere. Thus, the tract specific E.I.S. for the proposed Southern California O.C.S. oil and gas leasing was released on February 21, 1975. Hearings on that draft E.I.S. were held in Los Angeles on May 6, 7 and 8. We believe that Interior is violating NEPA in proceeding with O.C.S. tract specific activities prior to the completion of a final, legally adequate, program E.I.S. on accelerated O.C.S. development nationally and before any decision to proceed with that program has been made.

The primary injury caused by proceeding with tract activities at this time is that public input to the agency decisionmaking process is rendered ineffectual, thus creating a substantial risk that environmental values will not be fully considered. That injury is compounded by the fact that Interior has failed to provide a meaningful opportunity for additional review and comment on the tract proposal after the final program E.I.S. has been released and a decision made on the overall expanded O.C.S. leasing plan. Additionally, tract activities

requiring local review and comment at this time may prove to be an unnecessary waste of time, effort and money, should a decision later be made not to proceed with that overall leasing plan. Interior's premature tract activities, moreover, are likely to result in a bias in favor of proceeding with the accelerated nationwide and Southern California leasing programs. For these reasons, more fully discussed below, we believe that Interior's environmental review procedures violate NEPA.

A. PREMATURE PREPARATION AND ISSUANCE OF TRACT SPECIFIC
DRAFT E.I.S. FOR SOUTHERN CALIFORNIA O.C.S. LEASING

The tract specific draft E.I.S. for Southern California offshore oil and gas leasing was prepared and issued in advance of two critical stages in the decisional process: (1) the completion of a final programmatic E.I.S. on O.C.S. development nationwide containing all relevant comment on the environmental effects of the proposal and (2) a decision on whether to lease nationwide and if so, when, where, and according to what safeguards. The failure to consider the environmental insights of the final program E.I.S. or the character of any decision to lease in the preparation and of drafting the tract specific document renders the latter legally insufficient per se in its present form.

1. Failure to Consider the Final Program E.I.S.

As Calvert Cliffs has definitively established, NEPA requires that a final E.I.S., containing all comments received, must "accompany" a proposal through all existing agency review

processes and be given full and good faith "consideration" in those processes. 449 F.2d 1109 at 1117-18; 43 U.S.C. § 4332(c). The preparation of a tract specific E.I.S. is a distinct stage in the agency review process. Thus, a final program E.I.S., which has yet to be prepared, has not accompanied the agency proposal through each distinct stage in the review process, and has not been given the consideration demanded by § 102(2)(C).

Nor does it matter that a draft program E.I.S. was available at the time the tract specific draft E.I.S. was prepared. The draft program document does not contain the information on the environmental effects of the proposed expanded O.C.S. leasing plan received during the comment and review process. Moreover, a statement in the tract specific draft E.I.S. indicates that the document was prepared prior to the hearings at which public comments were received. Tract Specific Draft E.I.S., Vol. 2, p. 501, fn. 1. Those comments were extensive, many of which raise substantial doubts about the adequacy of the draft program statement. Those comments were not available and were not considered when the tract specific statement was prepared. Also not available and not considered were amendments to the draft program E.I.S. which will not be released until summer of 1975.

Had the above information on the environmental effects of the proposed Southern California leasing program been available and been considered when the tract document was prepared, its substance undoubtedly would have been entirely different. Agency review processes, in other words, have been undertaken without the good faith consideration of all relevant environmental

opinion mandated by NEPA and Calvert Cliffs. The tract specific draft E.I.S., in order to comply with NEPA, must be reevaluated in light of the final program E.I.S.

There is, then, a close and sequential relationship between the findings of the program E.I.S. and the preparation and evaluation of a tract specific E.I.S. CEQ guidelines confirm that sequential relationship:

In many cases, broad program statements will be required in order to assess the environmental effects of a number of individual actions on a given geographical area (e.g., coal leases), or environmental impacts that are generic or common to a series of agency actions (e.g., maintenance or waste handling practices), or the overall impact of a large-scale program or chain of contemplated projects (e.g., major lengths of highway as opposed to small segments). Subsequent statements on major individual actions will be necessary where such actions have significant environmental impacts not adequately evaluated in the program statement. 40 C.F.R. § 1500.6(d) (1). (Emphasis added.)

The tract specific E.I.S. cannot be a "subsequent" statement unless and until a final, legally adequate, program E.I.S. has been completed. Indeed, the very purpose of the subsequent tract specific statement is to evaluate those aspects of Southern California O.C.S. development not adequately discussed in the program E.I.S. - a determination that cannot possibly be made until a final program E.I.S. has been completed and released. Were the relationship not sequential, the duty to consider environmental factors as required by NEPA would be rendered meaningless. Interior, in other words, has taken the cart before the horse.

2. Failure to Consider Decision on Nationwide Leasing

The tract specific draft E.I.S. is legally deficient in yet another way, in that the document was released before a decision has been made to go forward with nationwide accelerated O.C.S. leasing. If a decision is made not to drill, the tract specific document will then be wholly unnecessary, its preparation a waste of time and public resources. Moreover, the premature preparation and release of a 2,000 page draft E.I.S. creates a possibility, even a likelihood, of bias by the agency in favor of a decision to lease nationwide. Even if a decision to lease is made, the character of that decision could drastically alter the scope and nature of the proposed agency action in Southern California, which would, of course, necessitate an amended tract specific E.I.S. The tract specific draft E.I.S., in order to comply with NEPA's duty to consider environmental factors, must be reevaluated when a decision to drill has been made.

B. PREMATURE HEARING AND COMMENT PROCESS FOR SOUTHERN CALIFORNIA TRACT SPECIFIC DRAFT E.I.S.

The tract specific draft E.I.S. for the proposed Southern California O.C.S. oil and gas leasing was released on February 21, 1975. Hearings on that draft E.I.S. were held in Los Angeles on May 6, 7 and 8. Initially, a deadline for all public comment was set for May 23. 40 Fed. Reg. 7692 (February 21, 1975). In a letter to Interior on February 27, we expressed our concern over the release of the tract specific draft E.I.S.

and the holding of public hearings on that proposal before the completion of a final program E.I.S. on expanded O.C.S. leasing nationwide and prior to any decision to proceed with that proposal. Also of importance was the close of the public comment period prior to the occurrence of those two events.

There were four reasons for our concern. First, unless and until a final, legally adequate, program E.I.S. has been released, it will be impossible for Californians intelligently and responsibly to fully understand and comment on the tract proposal for Southern California. Second, with a deadline for public comment on the tract draft E.I.S. of May 23, no meaningful opportunity to review that document in light of the final program E.I.S. has been provided. Second, there will be a substantial waste of time, effort, and money by local agencies and citizens who wish to comment on the tract proposal if a decision is later made not to proceed with the expanded national leasing program. Finally, proceeding with tract specific activities prematurely, with the attendant commitment of substantial resources by Interior, creates a likelihood of bias on the part of the agency in favor of a decision to drill both nationally and in Southern California. For these reasons, we sought a postponement of the hearings until issuance of the final program document and a decision to lease is made.

Despite our concern, Interior has chosen to proceed with tract specific activities. Necessarily, public comment must be made on the document without giving any consideration to the environmental information contained in the final program E.I.S. or to the character of any decision to undertake accelerated

leasing nationwide. To make matters worse, Interior has failed to provide a meaningful opportunity for review and comment on the tract specific draft E.I.S. after release of the program E.I.S. and any decision to go forward with the expanded national leasing program. True, Interior has decided to "accept" public comments on the tract specific E.I.S. for Southern California during a 60 day period following the release of the final program E.I.S. and during a 30-day period following release of the final tract E.I.S. for Southern California. Yet these procedures are totally inadequate for reasons set forth below.

Interior's procedures, then, raise several issues:

(1) Does the unavailability of the final program E.I.S. and the absence of a final decision to lease render the scheduled hearing and review process on the tract E.I.S. ineffectual? (2) Is there a right to comment on the tract E.I.S. after release of the final program E.I.S. and the decision to lease? (3) Do Interior's procedures preclude such comment? We think the answer to each of these questions is yes.

1. Unavailability of Final Program E.I.S.

Unless and until a final, legally adequate, program E.I.S. for accelerated leasing nationwide has been completed, federal, state, and local agencies and other interested parties cannot intelligently analyze, and comment on, the tract specific draft E.I.S. for Southern California O.C.S. leasing. NEPA requires that a final impact statement, containing all public comment on the environmental aspects of a proposed agency action,

must "accompany" the proposal through existing agency review processes. The purpose of that requirement is to ensure that environmental values are fully considered in agency decision-making. The hearing and comment period for the tract specific draft E.I.S. for Southern California is a critical agency review process. Yet the final program E.I.S. did not "accompany" Interior's proposal through the hearing process, nor will the final document be available before the close of the comment period. As a result, interested parties will not be able to consider the environmental information contained in the program E.I.S. in commenting upon the Southern California proposal, and the review process will not be informed by that information.

Thus, the primary injury caused by conducting the hearing and review process prior to the release of a final program E.I.S. is that the purpose and value of public comment has been vitiated. Much of the comment will prove to be unnecessary. More importantly, the comment will be diffuse and unfocused, for the issues in need of discussion will not yet be apparent. There is, in other words, a close and sequential relationship between the program and tract impact statements. Indeed, CEQ guidelines indicate that the purpose of the tract E.I.S. is to discuss those aspects of a major individual action "not adequately evaluated in the program statement." 40 C.F.R. § 1500.6(d)(1). Only upon the release of a final, legally adequate, program E.I.S. can it be determined what aspects of the Southern California project were not adequately discussed in the former document. Only then will public comment on Southern California oil and gas leasing be meaningful and the NEPA duty to consider environmental values satisfied.

The need for the final program E.I.S. before commenting on the tract proposal is even more critical in view of the extensive testimony and evidence about the inadequacies of the draft program E.I.S. presented at the February hearings on that document. Those inadequacies were so serious that Interior has decided to amend the program document. Those amendments, together with the public comment at the February hearings, should be made available before any hearing and review process on the tract specific draft E.I.S. takes place. Interior, moreover, has indicated that the final program document will be available this summer. Balancing the importance of meaningful public comment against a few months' delay, Interior's conduct is hardly the kind of systematic, reasoned decisionmaking envisioned by NEPA.

Thus, the scope and nature of public comment on the tract specific draft E.I.S. would undoubtedly be entirely different if the program document were available. Public comment would be directed to the localized effects of the Southern California leasing program. Yet such an analysis is not possible until broad program issues overlapping with proposed individualized projects are resolved. The scheduled hearing and review process on the tract specific draft E.I.S. for Southern California O.C.S. leasing renders public comment ineffectual and thus violates NEPA's duty to consider environmental factors in agency decisionmaking.

2. Absence of a Final Decision

The hearing and comment period will also be concluded before any decision is made whether to proceed with the accelerated

O.C.S. leasing program. If a decision is made not to drill, or to drill but not in Southern California, then the hearing and comment process on the tract E.I.S. will have been a total waste of both federal and local resources. Effective local comment requires a substantial expenditure of time, effort and money, and therefore is particularly burdensome for financially constrained local governments, small organizations, and private citizens. In view of the fact that actual oil and gas production is several years away, there would appear to be no necessity to proceed with Southern California tract activity so precipitously as to risk a waste of resources by local public and private entities and persons. Indeed, the premature rush toward Southern California O.C.S. development suggests a strong bias on the part of Interior in favor of a decision to lease, which is, of course, a substantial risk in proceeding with any tract activity prior to a final decision on the larger proposal.

Perhaps as important as the decision to lease nationwide is the content of that decision. If a decision is made to lease, Interior will also have to decide what tracts are to be leased and what terms should be incorporated in any lease sale to mitigate possible adverse environmental consequences. Interior, for example, could decide not to lease any tracts within 25 miles of shore. In Southern California, five areas are being considered for leasing, three shoreward of the Channel Islands, one of which is Santa Monica Bay, and two seaward of the Channel Islands, on the Santa Cortes Ridge. A national 25 mile limit would exclude all but the two areas west of the Channel Islands. Comment at the

hearings and during the review process can be expected to focus on Santa Monica Bay and San Pedro Bay, with very little comment on the outer tracts. Thus, if the Santa Monica Bay and San Pedro Bay areas were later eliminated by the decision made on the national leasing program, comment will not have focused in depth upon the environmental consequences of leasing in the outer areas.

Other decisions could also affect the hearing and comment process on the tract proposal. Interior could insist that all offshore platforms contain sun reflectors to protect the view from the beach. Strict liability for oil spills could be established, as could a revenue sharing mechanism to offset the cost to local governments of servicing onshore support facilities. Many of the environmental concerns about Southern California O.C.S. leasing could thus be resolved by any mitigation measures taken by Interior as part of its decision to lease nationwide. Yet directing attention to such matters now in connection with the tract E.I.S. necessarily means that the real issues affecting Southern California will not have been properly and meaningfully addressed.

Until the character of the national decision is known, Southern California communities can't really know what the proposed agency action is, let alone be able to comment intelligently on that action. The entire scope and nature of the proposed Southern California action could be altered by the program decision, thus necessitating an amended tract specific draft E.I.S., additional review and comment, and further waste of public resources at the local level. Conducting the hearing and

review process on the tract specific draft E.I.S. prior to the national program decision destroys the value of the only public comment to be permitted on the tract proposal and runs afoul of NEPA's procedural provisions which were designed to effectuate meaningful comment.

3. Right to Comment on Tract E.I.S. After Release of Program E.I.S. and Decision to Lease

The hearings on the tract specific draft E.I.S. have been rendered valueless by proceeding prior to the release of a final program E.I.S. and a decision to lease. Nor is it at all clear whether a meaningful opportunity for even written comment will be provided before those two events occur. The critical issue, then, is whether there exists a right to additional comment after those two events have occurred? We can conceive of no other conclusion consonant with NEPA than that such a right does exist.

As noted above, meaningful public comment on the tract specific E.I.S. cannot be made until the program E.I.S. is released and a decision is made to go forward with the national leasing program. Only then can commenting parties know to what extent issues affecting Southern California O.C.S. development were not adequately discussed in the program document or, for that matter, even what the proposed agency action will be. The lack of a meaningful opportunity to review the tract document after those events have occurred results in a failure to consider environmental values in agency decisionmaking as required by NEPA and Calvert Cliffs.

Other cases support the proposition that an additional comment period must be provided where necessary to ensure a meaningful opportunity for public comment on a proposed agency action. In both Daly v. Volpe, 350 F.Supp. 252, 260 (W.D. Wash. 1972) and Brooks v. Volpe, 350 F.Supp. 269, 280 (W.D. Wash. 1972), it was held that inadequate advance notice of hearings or of release of relevant documents resulted in a denial of opportunity for meaningful comment on an impact statement. An additional comment period was ordered to be provided. In City of Rye, New York v. Schuler, 355 F.Supp. 17 (S.D. N.Y. 1973), procedural deficiencies resulted in the denial of a full opportunity for effective public participation in highway corridor location hearings. Hearings were enjoined until after comments on all relevant issues were solicited, essential information on relevant issues was made available, and timely notice given. In Greene County Planning Board v. Federal Power Commission, 455 F.2d 412 (2d Cir. 1972), hearings were held before an E.I.S. was prepared by an agency's own staff. The court ordered a second round of hearings to be held after that statement had been prepared and circulated. In all four cases public hearings were required by law, but, whether by hearing or by written comment, NEPA requires no less than the same full opportunity for meaningful comment demanded in those cases. In this instance, that opportunity can occur only if comment is permitted after the final program E.I.S. is issued and a decision is made regarding expanded nationwide leasing.

Jicarilla Apache Tribe of Indians v. Morton, 471 F.2d 1275 (9th Cir. 1973), perhaps provides the most meaningful guide to when an extension of the NEPA comment process would be

appropriate. In that case, an energy study for the Southwest was released by the Interior Department after final impact statements had been completed for three coal-fired electric generating plants. Plaintiffs sought to reopen the comment and review process, arguing that availability of the study was essential to a meaningful evaluation of the environmental impact of the three projects. The court ruled that completion of the public review and comment stage prior to release of the study did not violate NEPA because the study, while its availability would have been of assistance, was not intended to consider the need for the power plants in question, or their environmental consequences, and in fact was a projection of future electric production after the plants there in question had been completed. The study, in other words, was of little probative value or relevance. The court, in reaching its decision, set forth criteria for when extensions of the comment period should be made:

Other factors must be considered in addition to the possibility of obtaining more complete information, including the consequences of delay, the present state of information concerning the environmental factors, and the degree of probative value and relevance of the information which may be gained by delay. There are certainly instances where the unavailability of information might require delays in filing draft statements or extensions of time in which to comment upon the statements, if the procedures of NEPA are to be conducted in a meaningful way. 471 F.2d at 1281 (Emphasis supplied.)

In this case, all four criteria are satisfied. The information gained from the final program E.I.S. and the character of any decision to drill will not only be of assistance, but are

essential if the real issues affecting Southern California are to be addressed. Balancing the benefits of a few months' delay against the harm to a project that will take years before full production is reached, the consequences of delay are minimal.

All four criteria, then, are satisfied in this instance, and, when combined with the interests arising out of the sequential relationship between program and tract E.I.S. - failure to consider environmental factors, waste of resources, and bias, the conclusion is overwhelming that an additional opportunity for meaningful comment on the tract specific draft E.I.S. must be provided after a final program E.I.S. is issued and a decision to lease is made.

4. Inadequacy of Interior's Comment Procedures

Interior, however, claims that there is ample opportunity to review the tract specific draft E.I.S. after the final program document has been issued and a decision is made about the accelerated national leasing program. Interior has announced that, although the deadline for written comment on the tract specific draft E.I.S. is May 23, comments on the tract document will also be "accepted" during a 60 day period following release of the final program E.I.S. and during a 30 day period following release of the final tract E.I.S. See Letter of March 23 from Assistant Secretary of Interior Royston Hughes to Mayor Tom Bradley and City Attorney Burt Pines; Notice of Public Hearing (April 8, 1975). Thus, on paper it would appear that an opportunity has been made available to comment on the tract E.I.S. after release of the final program E.I.S. and a decision to

lease nationally.

Yet upon further analysis that claim appears to have little basis in fact. First, Interior has limited comment on the tract E.I.S. during the 60-day period following release of the final program E.I.S. only to issues that are interrelated with issues discussed in the program E.I.S. By implication, comments will not be accepted that relate strictly to the Southern California leasing program and are unrelated to the program E.I.S. Thus, all purely local issues must be discussed by the May 23 deadline date. Yet by what act of divination are we to know at this time which issues are local and which are interrelated with the program document? The determination cannot be made until the final program E.I.S. is released.

Second, Interior has conceded that the 60-day waiting periods following release of the program and tract statements may overlap. That necessarily means that a final tract E.I.S. may be prepared and released even before comments are received on the final program E.I.S. and a decision is made about the national leasing program. In that event, the only opportunity for review and comment on the tract specific proposal, in light of the amended program E.I.S. and any decision to drill, is during the 30-day waiting period after the final tract proposal is sent to CEQ.

But comment during that period is useless because the comment received by Interior will not have been attached to the final tract document, nor considered or responded to therein as required by law. In order to comply with NEPA, comments on an E.I.S. must be responded to and considered in a final statement.

A final E.I.S., according to CEQ guidelines, must be "responsive to the comments received," 40 C.F.R. § 1500.2(b)(3), and should be released "with substantive comments attached," 40 C.F.R. § 1500.7(a). Necessarily, then, comments on the final program E.I.S. and the character of any decision to lease must be received before the final document is drafted and released. Once a final statement is issued, comments received thereafter will not receive the full good faith consideration required by NEPA and Calvert Cliffs. Put another way, the final decision on the national leasing program must precede the close of the comment period on the final tract E.I.S.

The waiting period which follows the release of a final impact statement, moreover, was never designed, nor is it regarded by CEQ, as a method of satisfying an agency's duty to elicit public comment on the potential environmental consequences of proposed agency action. The waiting period is merely a time during which political and legal action may be taken before the bulldozers begin to roll. Issuance of a final statement, in other words, is a decisive stage in the agency decisionmaking process after which the agency is not required to respond further to public comment.

Interior, then, would violate its duty to receive and consider input on environmental consequences if it were to release a final tract E.I.S. without first receiving comments on that document that reflect the impact on it of the national leasing decision. Moreover, if Interior were to indicate that comments received during the waiting period would be responded to and considered, then the document would not be "final" until the agency

prepares and releases its responsive comments. As a result, no decision could be made on the tract proposal "sooner than thirty (30) days after the final text of an environmental statement (together with comments) has been made available to the Council, commenting agencies and the public." 40 C.F.R. § 1500.11(b). Thus, either the final tract E.I.S. is indeed "final" as Interior appears to claim, in which event Interior has violated its duty to receive and consider input on environmental consequences, or the statement is not really "final" until the expiration of the waiting period and release of still another document with comments attached and responded to, in which event CEQ guidelines mandate another 30-day delay before any decision can be made to lease. Interior cannot have it both ways.

C. CONCLUSION

For the reasons outlined above, we believe that Interior's environmental review procedures for the proposed Southern California O.C.S. leasing are in violation of NEPA. Nevertheless, we have chosen to submit written comments on the deficiencies of the tract specific draft E.I.S. But we do so under protest and without any belief that we have been or will be provided with a meaningful opportunity to fairly comment on the proposal or, for that matter, that our comments will be seriously considered.

IV. INADEQUACIES OF THE E.I.S.

A. O.C.S. ISSUES NOT ADEQUATELY COVERED IN EITHER THE DRAFT PROGRAM E.I.S. OR DRAFT TRACT E.I.S.

In our analysis of the draft program E.I.S., we noted several critical issues relevant to the impact of expanded O.C.S. development nationwide that were inadequately discussed or not discussed at all. Many of these issues are equally applicable to the proposed Southern California O.C.S. leasing, yet have not been responded to in either the program E.I.S. or the tract E.I.S. Among these issues are the following:

1. Need for Coherent National Energy Policy

Neither E.I.S. has set forth a coherent national energy policy, nor delineated the role of O.C.S. leasing nationwide, and in Southern California, in meeting the nation's needs. Only when a comprehensive energy policy has been established will the need, or the extent of need, for accelerated leasing O.C.S. nationwide and in Southern California be known. What role, for example, should be played by other energy alternatives such as solar, geothermal, nuclear, oil shale, hydroelectric, bio-energy, and wave motion energy sources? To what extent can existing oil supplies be increased by production of shut-in wells, improving

secondary and tertiary recovery, and tapping onshore petroleum reserves held by the military at Elk Hills and "Naval Pet 4" in Alaska? How much can we reduce our need for additional offshore oil and gas development by adopting strict energy conservation measures? The answers to these critical questions regarding the national energy picture may obviate the need for O.C.S. development or at least suggest a slower rate of development.

2. No Discussion of Relative Environmental Impacts

The relative environmental impacts of O.C.S. drilling nationwide have yet to be adequately evaluated. The draft program E.I.S. contained no discussion of relative environmental impacts, and the draft tract E.I.S. contains but a short 25 page description of different areas proposed for leasing with little comparative evaluation. The Southern California O.C.S. is an unusually rich marine resource because of nutrient upwelling. It also is a unique recreational and commercial resource enjoyed by millions, a resource essential to the quality of life in Southern California. Clearly, any decision regarding accelerated national drilling and Southern California drilling must carefully consider and balance the potential environmental impacts on the California O.C.S. in contrast to the impacts in all other proposed areas.

3. Degradation of Air Quality

Neither document contains a sufficient discussion of the potential deterioration of air quality due to increased refinery and other onshore related activity. Increased refinery capacity and operation will clearly result in substantial increases in sulfur dioxide, particulate matter, nitrogen dioxide, carbon monoxide and hydrocarbons. The tract Specific E.I.S. gives but one page to the issue of air pollution and fails even to mention the secondary impacts on air quality from increased refinery activities. In view of the severe air pollution problems already faced in Southern California, this oversight is inexcusable.

4. Onshore Land Use Impacts

Little attention has been paid in either document to onshore land use impacts caused by O.C.S. support activities such as harbor and dock facilities, equipment storing areas, pipeline terminals and corridors, tank farms and transportation facilities, and refinery, petrochemical complexes and supporting construction industries. In view of the already overcrowded conditions in Southern California, treatment of this issue is wholly inadequate. The potential of these facilities for conflicting with other land use values, and the resulting environmental impacts, must be fully discussed and considered by one or the other E.I.S.

5. Economic Losses to Local Governments

Local governments will be seriously impacted by O.C.S. development as a result of two factors: the enormous economic costs caused by oil spills and the cost of additional municipal services provided to O.C.S. related developments. Neither the program E.I.S. nor the tract E.I.S. fully considers the economic impact of O.C.S. development, nor proposes any mitigating measures to offset those economic burdens.

6. Coastal Zone Management Act

As noted in our analysis of the draft programmatic E.I.S. for accelerated leasing nationwide, Interior's leasing timetable circumvents the purposes of the 1972 Coastal Zone Management Act. O.C.S. leasing should be postponed until such time as the states have had an opportunity to adopt coastal zone management plans and have such plans approved by the U.S. Secretary of Commerce, as provided for in the Coastal Zone Management Act. Once such approval is obtained, any federal agency conducting or supporting an activity directly affecting the coastal zone shall, to the maximum extent practicable, conduct such activities consistent with approved management programs.

B. ENVIRONMENTAL IMPACT OF SOUTHERN
CALIFORNIA O.C.S. LEASING

1. Insufficient Data for Environmental Analysis

Although Interior has surveyed the existing scientific literature in an attempt to determine the environmental impacts of Southern California O.C.S. leasing, there are still many "unknowns." We need further information and studies regarding marine and coastal resources, as well as the potential impact of O.C.S. development on these resources. We believe that the Department of Interior has an affirmative obligation to develop the necessary data for evaluation of the full impact of O.C.S. development.

Baseline data on marine and coastal resources, then, appears to be essential. We note that the Bureau of Land Management in Los Angeles has recently begun to contract with universities and research organizations to accumulate necessary baseline data. On April 1, 1975 the BLM contracted with the University of California at Santa Cruz and with the University of California at Irvine for a study of marine mammals and birds in the Southern California Bight. We are informed that U.S.G.S. is also helping with this research. Early in May, 1975 an RFP ("Request for Proposals") was issued requesting interested parties to submit proposals to BLM for baseline studies. This RFP, according to BLM officials, was sent to between 200 and 300 scientists and universities. We are informed that the BLM

intends to begin negotiations sometime in May regarding this RFP. Although the Department of Interior contends that baseline data is needed only to monitor O.C.S. production, we believe that a certain basic knowledge of our resources is essential to a reasoned evaluation of the impact of leasing.

There also is need for more definitive studies of the impact of O.C.S. leasing on marine life. At a conference held at the Los Angeles Museum of Natural History on April 15, 1975, Dr. Malcolm Gordon, a biologist at UCLA, claimed that no studies had been done by Interior on the toxicological effects of drilling muds, no experimental studies of the effects on community structures of exposure to oil pollution, and no studies on the possible reproductive and genetic effects of oil spills on marine life. He also indicated a critical lack of information regarding benthic and mid-water life systems, and the effects thereon of chronic, low-level pollution. As Dr. Enright indicates in his scientific advisory report in Part Two, there is also concern that pollution inhibits photosynthesis with respect to planktonic species. BLM recognizes that danger, see Draft Tract E.I.S., Vol. 2, p. 168, but apparently does not intend to conduct more definitive studies. In our analysis of the draft programmatic E.I.S., we noted many other unknowns regarding the impact of O.C.S. leasing. See Analysis, pp. 187-207.

Yet one "unknown" potential impact which stands out above all others as needing more definitive study is possible carcinogenic uptake in the marine food chain. An article in the Los Angeles Herald Examiner on Sunday, February 16, 1975 discussed the

possibility that oil spills might cause cancer in clams, scallops, and oysters. According to Dr. Paul Yevich, a pathologist on the staff of the National Marine Water Quality Laboratory in Narragansett, Rhode Island, soft-shell clams, depending on the type of oil spill, get a particularly pervasive form of reproductive cell cancer which quickly spreads to their every organ. The scallops develop growths on the insides of their blood vessels and hearts, suggestive of certain cardiac conditions in man, as do the oysters, while the lobsters apparently suffer a loss of chitin, the material which hardens their shells.

In the last four years, Dr. Yevich has examined more than 9,000 soft-shell clams and found carcinogenic changes only in those that had been exposed to oil. When there was a spill of both jet fuel and crude oil from Air Force onshore storage tanks in Maine, he reported, "Thousands upon thousands of these animals died." That spill, he explained, occurred in March, 1971, but periodic studies made since have shown that the danger persists. In fact, he explained, hydrocarbon residues in bottom sediment have spread the toxicity miles and miles from the original location of the spill--one reason the State of Maine is suing the Air Force for \$90,000.00. As recently as last year, for example, samples of clams were obtained from various neighboring waters which revealed a cancer incidence of 9 to 18%.

Besides reporting on field studies in several places where various kinds of oil spills occurred, Yevich told of laboratory experiments in which shell fish have been exposed to low

levels of crude oil over periods of several weeks. In the face of such chronic exposure, even as little as one part per million of oil in water products produces pathological changes, he reported, and no one really knows whether even lesser concentrations may be harmful as well.

Besides being potentially destructive of marine animals, oil spills may be no laughing matter for man. Yevich, for example, had been told by a physician living in Texas that there had been a tremendous increase of allergies among people who eat fish that swim among the offshore oil rigs. Such reports merit investigation, the more so because softshell clams from the site of an oil spill and subsequent detergent clean-up on the Canadian border have been found to have inflamed gills. When Dr. Yevich was questioned on the meaning of these facts for mankind, his answer was, "Gentlemen, we are dealing with a world of unknowns."

The draft tract specific E.I.S. appears to be equivocal on the issue of the possibility of carcinogenic effects from O.C.S. development. Contradictory positions are presented by Interior within the context of this one statement. On page 68 of Volume 2, in discussing the impacts of oil on phytoplankton, the E.I.S. states, "No evidence was found in the literature that spilled oil enters marine food chains via adsorption or absorption by phytoplankton and subsequent ingestion by grazing herbivores." However, on page 87 of Vol. 2, this statement occurs: "The demersal fish feed largely on benthic organisms and the greatest threat to their food source would be burial and construction

activity in the areas of sewage outfalls and heavy bottom sediment pollution which would be resuspended into the water column. Thus, harmful substances (e.g. DDT) could be taken up into the benthic community which would thereby serve as a link for passing the pollutants on to the bottom-feeding fish." This latter statement indicates that, even if the hydrocarbons from oil were not incorporated into the food chain, there is still a possibility that oil spills will result in other toxic substances being introduced into the food chain. Thus, the chances of some toxicity being introduced into the food chain as a result of spills and discharges is not insubstantial.

Page 70 of Vol. 2 describes this issue thusly: "It is difficult to assess or predict potential damage of chemical pollution to one group of organisms, i. e., plankton, but it seems appropriate to discuss the problem at this point. A few scientists have offered cautious speculation. A more pessimistic view is taken by Blumer (1969) who has stated: '. . . we are rather ignorant about long-term effects.' Blumer (Ibid) then points out that hydrocarbons are taken up into the food chain, and through the process of biological magnification can become concentrated in marine species used by man for food." In Vol. 3, an article appears on page 615 entitled Effects of Oil on Marine Ecosystems, summarizing the scientific research that has been done on toxicity and carcinogenicity of petroleum on living organisms. The article strongly supports Blumer's position. For example, the following statement appears at page

"The entrance of oil-derived hydrocarbons into marine food chains is evident. Smith (1968, p.49) reported that the presence of oil and benzene-ring compounds in the feces of limpets browsing on an oily deposit has been demonstrated chemically; similar observations have been made on top-shells, Monodonta, and limpets, Patella, living on oily rocks at Prerranuthnoe. He reported, the proportion of oil in material ingested by these animals was estimated at about 20 to 30% in Patella and 5 to 50% in Monodonta. Smith (1968, p. 65) believed it unlikely that any food value to the browser is derived from such feeding activity. However, such feeding activity does concentrate hydrocarbons in organisms that are in turn eaten by larger animals and the oil thus enters the food chains."

The article provides a succinct summary of the detrimental effects of petroleum on the ecosystem:

"Blumer (1970, p. 12) summarizes the potential damage to marine ecology from pollution with crude oil and oil fractions as follows: (1) direct kill of organisms through coating and asphyxiation. (2) direct kill through contact poisoning of organisms. (3) direct kill through exposure to the water-soluble toxic components of oil at some distance in space and time from the accident. (4) destruction of the generally more sensitive juvenile forms of organisms. (5) destruction of the food sources of high species. (6) incorporation of sublethal amounts of oil and oil products into organisms resulting in reduced resistance to infection and other stresses (the principal cause of death in birds surviving the immediate exposure to oil). (7) incorporation of carcinogenic and potentially mutagenic chemicals into marine organisms. (8) low level effects that may interrupt any of the numerous events necessary for the propagation of marine species and for the survival of those species which stand higher in the marine food web."

In addition to the preceding material, the following

facts are relevant to this issue: Hydrocarbons are synthesized by most, if not all, living organisms. Hydrocarbons are fat soluble and thus have the potential to be retained and accumulated in organisms. Low-boiling saturated hydrocarbons are related to the fat soluble anaesthetics and have a narcotic effect on a wide variety of animals. In lower animals at low concentrations they often cause sleep or irreversible insensibility. At higher concentrations, they often cause cell damage and death, especially in larval and juvenile stages of marine organisms.

Low-boiling aromatic hydrocarbons comprise the most toxic petroleum fractions. The low-boiling aromatics are acutely poisonous to man and marine organisms alike. Benzene, toluene and phenols, such as found in crude oil, produce in man reactions similar to those of alcohol. The initial reaction is restlessness, then excitement, inebriation, drowsiness, depression and sleep. Death may follow from respiratory failure as the concentration rises (Goldacre, 1968). Chronic exposure to low concentrations of some aromatics, especially benzene, may cause bone marrow disease, chromosome aberrations and leukemia (Finkel, 1960). Low-boiling aromatics even more water-soluble than the saturates, can cause mortality of marine organisms by contact, even with diluted solutions (Blumer, 1970, p. 3.)

Evidence exists, then, of the potential carcinogenic uptake in marine food chains as a result of oil spills. These

studies are inconclusive, speculative and disputed by BLM and others. Yet the issue should be thoroughly researched before any leasing decision is made.

2. Failure to Measure Cumulative Impacts

One of the glaring deficiencies of the draft tract E.I.S. for Southern California O.C.S. leasing is its failure to consider the cumulative impacts of O.C.S. development. Analysis of cumulative impacts is not only essential to successful future planning but required by CEQ guidelines: "The interrelationships and cumulative environmental impacts of the proposed action and other related Federal projects shall be presented in the statement." 40 C.F.R. § 1500.8(a)(1).

Cumulative impacts also include impacts from other energy related development. The tract's discussion of cumulative energy impacts is insufficient. Mr. Robert Soloman of the California Energy Commission staff put it most aptly, "Now, if you read each of these impact statements separately, they always tend to conclude that the impacts of the proposed projects is negligible and, therefore, the projects should go ahead. The question is what happens when you add up all these impacts?" Hearings on Draft Tract E.I.S., Los Angeles, May 8, 1975. Currently, studies are underway by the Congress through the Office of Technology Assessment to consider the total "environmental load" that will be sustained on the Atlantic

Coast as a result on O.C.S. and other energy related development. Similar studies should be conducted for Southern California.

The cumulative impacts of energy related development in Southern California, moreover, appear to be far-reaching, even approaching maximum "environmental load." Within the proposed lease sale areas, there are two proposed deep water ports (Los Angeles and Long Beach), two liquid natural gas (LNG) terminal facilities (Los Angeles and Oxnard), and a refinery and marine terminal (Carlsbad), in addition to proposed O.C.S. development. There is also a need for additional nuclear energy. Additional refineries are needed for the production of low-sulphur fuel. There will also be considerable transportation of oil from the Alaskan North Slope and from the Middle East. Continuing importation may dictate a deep water superport. These energy activities also have substantial onshore activities, particularly near shore as industry seeks the transportation advantages of coastal location. Transporting Alaskan oil to the Midwest and East will necessitate transportation routes, transportation facilities, and other onshore impacts. The cumulative impacts of energy related development, then, are extensive.

Yet we must plan with cumulative impacts in mind. Until now, moreover, there has been no systematic energy planning, as a result of which chaotic development is now occurring. In Southern California, we have no mechanism for assessing in any systematic and comprehensive manner these environmental loads.

There is no state or federal agency articulating policy guidelines for California in choosing among options. We call for a complete assessment of the total "environmental load" of energy development in Southern California.

3. Need for Regional Analysis of Distinct Areas

The draft tract E.I.S. for Southern California O.C.S. leasing postulates development of five general areas containing 297 tracts. These areas include the following:

- a. San Pedro Bay
- b. Santa Monica shelf and basin
- c. Santa Barbara (Santa Catalina area)
- d. Santa Rosa Cortes area north
- e. Santa Rosa Cortes area south (Tanner Cortes banks)

Yet these five areas are vastly dissimilar in geography, water depth, seismic activity, marine resources, proximity to recreational and commercial uses, etc., and suggest that each general area should be described and discussed separately. Indeed, the tract document concedes that "no single tract (or set of tracts) could be considered as typical or representative of the entire area." Draft Tract E.I.S., Vol. 3, p. 141.

The draft tract E.I.S., however, describes the Southern California O.C.S. as if it were one area. Although a proximity evaluation is made of proposed tracts to impact producing factors which may result from their development, that analysis is ad-

mittedly "subjective," see Draft Tract E.I.S., Vol. 2, p. 343, and does not provide an integrated analysis of leasing in the five general areas. Also, because the bases for that proximity evaluation are not fully set forth, independent review of that evaluation is not possible. We believe that a separate E.I.S. should be prepared for each of the five general areas.

4. Need for Further Study

A recurring theme in this discussion of the adequacy of the E.I.S. is the existence of "unknowns" and the need for further study before any leasing decision. We need completed baseline studies in order to know what resources exist that may be effected by O.C.S. development. We need more definitive studies of the impact of oil pollution on marine biota, particularly on potential carcinogenic uptake in the marine food chain. We need an integrated analysis of the cumulative impact of O.C.S. and other energy related development in Southern California. We need a regional analysis of the five vastly dissimilar regions proposed for leasing. We call for these additional studies not for the sake of endless study but because such studies are essential to reasoned decision-making. They also appear called for by NEPA: "The proper response to comments which are both relevant and reasonable is to either conduct the research necessary to provide satisfactory answers, or to refer to those places in the impact statement which

provide them." Lathan v. Volpe, 350 F. Supp. 262, 265 (W.D. Wash. 1972). And in E.D.F. v. Hardin, 325 F. Supp. 1401 at 1403 (D.C.D.C. 1971), the court held that NEPA "makes the completion of an adequate research program a prerequisite to agency action. The adequacy of the research should be judged in light of the scope of the proposed program and to the extent to which existing knowledge raises the possibility of potential adverse environmental effect." NEPA, then, places an affirmative obligation upon federal agencies to develop missing data.

C. UNAVOIDABLE ADVERSE IMPACTS

1. Oil Spills - Environmental and Economic Effects

The draft tract E.I.S. concedes that oil spillage in Southern California waters will dramatically increase as a result of O.C.S. development. With a natural background spillage of approximately 3,650 barrels per year, Interior's high case estimate of future oil spillage is 82,600 to 116,000 barrels per year. If correct, there will be a total oil input to marine ecosystems each year in an amount equal to the 1969 Santa Barbara oil spill disaster.

The possibility of a blow-out similar to the Santa Barbara experience may be somewhat diminished as a result of stricter regulations, improved blow-out prevention training, technological advances, and more frequent inspections. Yet oil industry engineering experts regard human error as the primary cause of blow-outs. No one can guarantee against a repetition of the Santa Barbara disaster.

While the probability of a major blow-out has been reduced since 1969, the probability of a major oil spill occurring as a result of increased tanker traffic has greatly increased. This is especially true of Santa Barbara Channel, which is already the busiest shipping lane on the Pacific coast. Increased oil tanker traffic from Alaska coupled with increased traffic from resumption of offshore oil drilling substantially increase

the probability of an oil tanker colliding with another vessel or, worse yet, with another tanker or with an offshore platform. The draft tract specific E.I.S. admits the likelihood of such major oil spills.

Even more troublesome than major spill events are the cumulative effects of chronic small or moderate spills emanating from tankers, platforms and broken underwater pipelines. The draft tract E.I.S. postulates that there will be a maximum leakage from pipelines of nearly 5,000 barrels of oil per year. Draft Tract E.I.S., Vol. II, p. 19. Interior concedes on the same page that the problem of pipeline leaks from anchor dragging has not yet been solved.

The total long term damage to the marine and coastal environment from such major increased pollution is, of course, extremely difficult to assess. One scientist, noting that the number of marine organisms after the Santa Barbara spill appeared to be roughly comparable to pre-spill populations, has concluded that the spill's effect on marine life was negligible. Straughan, Biological and Oceanographical Survey of Santa Barbara Channel Oil Spill, 1969-70, 1971. Others dispute that conclusion, arguing that no adequate baseline information was available to make such comparisons and charging that the study included no physical or chemical analysis of subtle toxic effects. Blumer, Scientific Aspects of the Oil Spill Problem, 1971; Connell, A Review of Straughan, 1972. Scientists, then, are not certain about the long-term damage to the marine environment of oil spills. As noted in

an earlier section, one of the major "unknowns" is the possible carcinogenic effect of oil pollution on marine species and uptake into the marine food chain. These are serious problems which deserve further study and analysis.

The draft tract E.I.S., moreover, makes a serious mistake in assuming as it does that the effects of massive spills are mitigated by subsequent biological recovery. Interior's high case estimates of oil spillage postulate a yearly amount of pollution equal to the Santa Barbara spill. Yet the tract specific draft E.I.S. contains no discussion of the cumulative impact of spills on the marine environment year after year without opportunity for recovery. NEPA requires that the cumulative effects of a proposed agency action be considered in the E.I.S. We believe that the failure to consider the cumulative impact of yearly spills without the same opportunity for recovery as existed after the Santa Barbara spill is a serious deficiency which must be remedied in the final E.I.S.

Whatever the long-term damage to the marine ecosystem, the short-run effects of oil spillage are undeniably severe, as the Santa Barbara experience has taught us. Dr. Max Blumer of Woods Hole has summarized the potential effects on marine life of crude oil pollution:

- (a) Direct kill of organisms through coating and asphyxiation.
- (b) Direct kill through contact poisoning.

- (c) Direct kill through exposure to the water soluble toxic components of oil at some distance in space and time from the accident.
- (d) Destruction of the generally more sensitive juvenile forms of organisms.
- (e) Destruction of the food sources of higher species.
- (f) Incorporation of sub-lethal amounts of oil and oil products into organisms resulting in reduced resistance to infection and other stresses (the principal cause of death in birds surviving the immediate exposure to oil)
- (g) Incorporation of carcinogenic or potentially mutagenic chemicals into marine organisms.
- (h) Low level effects that may interrupt any of the numerous events necessary for the propagation of the marine species and for the survival of those species which stand higher in the marine food web.

Many of these effects on the marine environment manifested themselves following the Santa Barbara Oil spill. Foster, The Santa Barbara Oil Spill: A Review of Damage to Marine Organisms, 1974. Organisms in the rocky intertidal zones suffered severely. The smothering effect of the oil killed barnacles, surf grass, organisms living in the habitat provided by the surf grass such as limpets and polychaete worms, and many other species

which commonly inhabit the cracks and crevices of the intertidal and splash zones such as periwinkles, pillbugs, flatworms, sand hoppers, limpets, beetles, etc. Sand blasting and steam cleaning to remove oil stains from rocks appear to have killed many intertidal organisms. A team of researchers has estimated that 60% of the mussels in Santa Barbara Harbor were killed as a result of steam cleaning. Jones, et al., Just How Serious Was the Santa Barbara Oil Spill?, 1969.

Long-term damage to rocky intertidal organisms also occurred as a result of loss of habitat due to the build up of dried oil on rocks. Sessile organisms do not adhere to or grow as well on dried oil. Over eleven million square feet of rock on public land are still contaminated with oil from the Santa Barbara oil spill. U.R.S., Physical Assessment and Cleanup-Restoration Cost Estimate of Coastal Areas Contaminated by Material Related to the 1969 Santa Barbara Oil Spill Incident, 1974. Possible long-term effects include reduction in breathing success due to sublethal oil contamination, indirect reduction in predatory species resulting from loss of prey, and the uptake of hydrocarbons by higher order species from intertidal organisms. These consequences have not been fully investigated.

Marine bird losses provide the most dramatic example of the environmental consequences of a major oil spill. Oil disrupts the water repellant properties of feathers, causing birds to become water-logged and sink, and also destroys the thermal insulating properties of feathers, causing loss of body heat. Birds

also die from oil ingested during preening or feeding. Diving birds like the loon and grebe were particularly affected during the Santa Barbara disaster. Attempts to save birds by cleaning their feathers proved futile. Possible long-term effects include reduction in breeding success and the uptake of hydrocarbons.

The economic costs of a major spill are enormous. Aside from the value of lost oil, Union Oil Company spent \$10 million on well control and beach cleanup, while governmental agencies spent another \$639,200. Mead & Sorenson, The Economic Cost of the Santa Barbara Oil Spill, 1970. An estimate has been formulated that the total cost to cleanup and restore still contaminated rocks and sand on publicly owned parks and tidelands would range from 11.8 million to 30 million dollars. U.R.S., supra.

As for measuring the economic cost of damage to marine life, two alternative approaches have been suggested. The first approach is to estimate the cost of replacing the dead or damaged marine organisms. Total damages as a result of the Santa Barbara spill were estimated at \$10 million by this method. Sorenson, Economic Evaluation of Environmental Damage Resulting From the Santa Barbara Oil Spill, 1974. The alternative approach is to measure the short-term reduction in resource yields. In this approach, the contribution of the resource to the food chain ultimately represented in fish catch, is measured and added to the yield in terms of amenity values of the intertidal and

other organisms which were destroyed. Added to this is the information cost of determining long-run damage. Using a resource yield theory of short-run damages, Sorenson estimates the economic cost of the Santa Barbara spill to be \$6,831,624.00.

Spills cause indirect economic losses to State and local governments in a variety of ways. As a result of the Santa Barbara spill, beaches owned by State and local governments diminished in property value and yielded interim rent and utility losses. These losses have been appraised at \$3.9 to 5.1 million for the State of California, \$2.6 to 3.2 million for the City of Santa Barbara, \$234,000 to \$326,000 for the County of Santa Barbara and \$215,000 to \$280,000 for the City of Carpinteria. These losses, which range from \$6.9 to 8.9 million do not include the cost of cleanup operations, nor do they include losses suffered by local governments in Ventura County or by private land owners. Affidavit of George Hamilton Jones in State of California v. Union Oil Company, No. 69-1068-RM, United States District Court, Central District of California.

The State of California and local governments also suffered lost sales tax revenues because of lost beach use and lost tourism. The spill cost the State of California \$17 million in sales tax, the County of Santa Barbara \$1.1 million in sales taxes and \$500,000 in property taxes, the City of Santa Barbara \$3 million in sales taxes and \$600,000 in bed taxes, and the City of Carpinteria over \$566,000 in tax revenues. These losses do not include losses by local governments in Ventura County.

Testimony of A. Barry Capello, City Attorney of Santa Barbara, before California State Lands Commission, 1974.

Another environmental and socio-economic impact of the Santa Barbara spill was the diminution of public services to local communities. Reduced public services occurred as a result of redeploying existing resources to handle the spill and of lost tax revenues. No value has been estimated for the loss of public services.

The commercial fishing industry also suffered damage from the oil spill. Fishermen were unable to get boats out of Santa Barbara Harbor because of oil containment booms. There was little fishing to be done anyway because of fear of oil damage to vessels and equipment and contaminated catches. Sorensen, supra, calculated damage to commercial fishermen to be \$804,250.

No damages to tourism have ever been estimated because losses to local businesses were cancelled out by gains in other geographical areas. The loss in bed tax revenues by the City of Santa Barbara and the City of Carpinteria, however, indicates that the losses were substantial.

Sorensen, supra, also estimates that the recreational value of beach experiences lost to residents and visitors was \$3,150,000. Beachfront real estate was damaged by the spill and property values declined. Sorensen, supra, estimated the loss in property value to be \$1,197,000.

The Santa Barbara experience, then, provides valuable

insight into the economic and environmental consequences of oil spills. Indeed, that spill stands out conspicuously in the minds of all coastal communities as the paradigm of the potential hazards associated with offshore drilling. Yet, neither the draft program E.I.S. nor the draft tract E.I.S. devoted more than a few pages to this disaster.

In summary, oil spills are inevitable and the total spillage may well amount to the equivalent of one Santa Barbara spill per year. Oil spills do serious short-term, and, more importantly, may do long-term, damage to the biological life and physical characteristics of the marine and coastal environment. In this regard, we are particularly concerned with the cumulative effects of oil spills on marine ecosystems without sufficient opportunity for biological recovery, the possible carcinogenic effect of oil pollution on marine species, and the uptake of pollution into the marine food chain. The economic costs of oil spillage are enormous, causing losses to many people and public entities directly and indirectly. The total cost of the 1969 oil spill, for example, has never been calculated. Indeed, its effects are still being felt. We believe that any proposal for O.C.S. development must fully consider such impacts, safeguard against serious long-term environmental damage, and guarantee any financial losses. These problems should be more thoroughly addressed in the final statement.

2. Onshore Land Use Impacts

Many related onshore activities will require exclusive use of land in coastal areas where intense competition for use of land occurs. Onshore activities related to O.C.S. development having primary land use impacts would include, but are not limited to: navigation and access channels, crew boat basins, equipment storage depots, warehousing areas, clean-up and containment equipment staging areas, pipeline terminals and corridors, tank farms, trans-shipment and road or transportation accommodation facilities, refineries, petrochemical complexes and supporting construction industries.

Water and air pollution associated with these onshore activities will occur, though possibly ameliorated by the use of various control technologies. Impacts on aesthetic and scenic values may be adverse and displeasing as a consequence of construction of onshore terminals, product storage facilities, and pumping stations, if these facilities are located in areas valued for their natural or scenic qualities. Noise pollution from vehicular traffic to and from these facilities may also result, reducing aesthetic enjoyment of scenic and natural areas. The severity of these impacts on the land is also keyed to the pace of development; generally speaking, the faster the development, the shorter the available time for planning for related impacts.

None of the preceding description contends with major onshore land use impacts associated with the potential catastrophe

of an oil spill, which, in light of recent freighter accidents near Hong Kong and off the Scottish coast, provides cause for concern and evaluation. Such an occurrence--whether accidental or chronic--could also have its onshore land impacts. If a spill reached the shore, the primary shore land impact would be, dependent on severity, the potential for preventing citizen use of the beaches. The secondary impacts include a loss in coastal tourist trade, in commercially productive tourist centers, with accompanying effects in diminution in land value and the aesthetic enjoyment of the coast. This is very significant in light of the fact that the tourist industry is the third largest industry in California.

Although the possible primary onshore impacts appear substantial, some of the most significant environmental impacts are secondary impacts. These include land use impacts on the affected community infrastructures comprised of physical and service systems, and business and governmental institutions. Particularly with rapid population increases related to O.C.S. development, induced impacts could be suffered by the water supply and sewage systems, the energy supply, residential, recreational, commercial and industrial facilities, air quality, and various transportation sectors. Support services for O.C.S. development are also bound to have a contributing impact. For each community affected, for example, additional schools, law enforcement and fire protection, health care and hospital facilities, sewage handling, solid waste management, and government plan-

ning and organization will be needed.

Despite these considerable land use impacts, the draft tract specific E.I.S. does not view those impacts as a significant problem because onshore activities will be regulated by the California Coastal Zone Commission and by other local agency land use controls. We believe that this position is in error for several reasons.

First, such state and local agencies do not control the land use impacts of activities originating from locations beyond their jurisdictions, such as oil spills and air pollution. Second, if O.C.S. development takes place, affected local governments will be faced with difficult port siting, onshore storage and tankage, construction and lay down, and refinery siting questions that may be beyond the capacity of local governments to deal with in a comprehensive and coordinated manner. While California's Coastal Zone Conservation Commission will take the lead in that regard for coastal communities, their jurisdiction extends only 1,000 yards inland. Non-coastal communities are without coordinated planning. As for the Coastal Commission, a shoreline plan has yet to be adopted. We believe any lease sales should await implementation of that plan. Once the lease sale occurs, and exploration and drilling commence, there exists the possibility of oil spills and air pollution (from fires) which will have potential land use impacts.

Finally, the treatment of land use consumption as an

irreversible commitment of resources is woefully inadequate. Less than one full page is given to this subject in the draft tract E.I.S. (p.435-436) and the discussion is limited to the use of 1,000 acres for pipeline construction in Ventura County. What about new refineries? What about storage facilities? What about changes in demographic patterns as a result of new employment opportunities? What about the land use impacts of increased onshore activities and new communities? Clearly, more land than the 1,000 acres in Ventura County will be consumed as a result of O.C.S. development, particularly in secondary ways. In an area as populated as Southern California, land use consumption from O.C.S. development limits the areas available for recreational uses, view sites, parks, residential areas and other commercial and non-commercial uses. The failure to fully analyze the irreversible and irretrievable commitment of land resources, particularly those that occur as a result of secondary activities, is one of the most serious omissions in the draft tract specific E.I.S.

3. Degradation of Air Quality

The draft tract specific E.I.S. devotes but one page to deterioration of air quality. The discussion implies that no serious degradation of air quality would occur unless there was a fire, a possibility which is one of the risks connected with oil production.

This summary treatment of the possible adverse impact

on air quality, especially in the circumstances of Southern California which is substantially impacted by air pollution, is completely inadequate. Air pollution is one of California's most serious environmental problems. Any increase in this pollution must not be lightly regarded.

O.C.S. development may have a substantial adverse effect on air quality, depending upon where the petroleum is refined. Possible increases in refinery capacity in the South Coast Air Basin must be addressed. Increased refinery capacity in the South Coast Air Basin would add substantial amounts of sulfur dioxide, particulate matter, nitrogen dioxide, carbon monoxide and hydrocarbons to the air.

California presently has 34 refineries with an estimated crude oil capacity of 1,852,000 bbls. per day. Fifteen refineries are located in the South Coast Region with a total capacity of 1,012,000 bbls. per day. Ten of these refineries are located in coastal regions.

Increased demand for petroleum products, anticipated imports from the Alaskan north slope and Southern California O.C.S. leasing would combine to increase pressure to construct new refineries along the west coast. Economic considerations, including major capital requirements, construction, labor, material costs and accessible markets, enhance the probability that new refineries would be located in the vicinity of large metropolitan markets. In fact, 12 refinery projects have been proposed for construction in California. The issue of whether the petroleum

would be refined here or piped/shipped to other regions must be discussed.

A recent study by the Radian Corporation analyzed the environmental ramifications of refinery construction and production. A large new refinery with the production capacity of 200,000 bbls./day was selected as a model for study. A typical refinery consists of a combination of standardized unit processes. Each unit process contains equipment to perform a refining operation on whole crude, or a fraction of the crude. These refining operations include separation by fractionation, conversion by catalytic reaction to more desirable or higher quality products, product treating processes, and auxiliary operations for such purposes as by-product control, storage and others. Ambient air emission estimates were prepared for each of the unit processes.

Sulfur dioxide is emitted from refineries as a result of processing fuels containing sulfur. If the sulfur content is low, as is projected for Southern California O.C.S. oil, the resulting sulfur dioxide is minimized. Modern control technology does exist which can reduce but not eliminate sulfur emissions. The coastal portions of the South Coast Air Basin already suffer from unacceptably high levels of sulfur. To the extent that refining capacity is increased the problem will be aggravated. The tract specific E.I.S. must project the extent of increased sulfur emissions which would result from Southern California O.C.S. development. A commitment to reduction of sulfur emis-

sions by use of hydrodesulfurization and flue gas desulphurization must be made.

Nitrogen dioxides are a component of flue gases which are also released. Generally, nitrogen dioxide can be controlled by combustion control designed features such as 2-stage combustion or offstoichiometric firing. One exception is the ethylene plant. High flame temperatures are required by this process, precluding combustion modification. Uncontrolled emissions of nitrogen dioxides are a result.

The "cat" cracker is a significant potential source of particulate matter and carbon monoxide. The catalytic cracking process converts heavy distillant oils (typical boiling range of 650° to 900°F.) into petroleum factions of lower boiling range and of correspondingly lower molecular weight. Refineries should be required to install the best available control devices in an attempt to achieve and maintain particulate and carbon monoxide ambient air quality levels.

A violation of the hydrocarbon standard by itself is not reported to constitute a public health hazard, but photochemicals formed by hydrocarbons do create hazards to the public's health. The Radian Study indicates that even if the best control devices and good maintenance procedures were followed, hydrocarbon emissions would be in excess of federal standards by a factor of 20 to 40. Hydrocarbon leaks were found by Radian throughout the refinery and storage areas and especially around pumps, valve glands and flange areas in the refineries

studied.

The Radian Study reports that the estimated impact of a 200,000 bbl./day refinery upon ambient air quality can be significant. Hydrocarbon emissions from additional refineries in the South Coast Air Basin would prevent the attainment and maintenance of ambient quality standards.

The South Coast Air Basin already produces 38% of the total tonnage of air pollutants in California. Stationary sources (including refineries) contributed 28% of the total emissions during 1972. Furthermore, refineries were estimated to contribute more than 100 tons a day of nitrogen oxide emissions found in the Los Angeles basin. The Los Angeles Air Pollution Control District reports that petroleum refineries within Los Angeles County were responsible for 55 tons per day of SO₂ in 1973 (out of a total of 320 for all stationary sources). 5 tons of particulates per day (out of a total of 65 tons for all stationary sources) and 5 tons reacting hydrocarbon (out of a total of 15 tons for all stationary sources).

The air quality in Southern California is so far from reaching primary ambient air quality standards at the present time that inland cities in Southern California are greatly concerned about any increase in air pollution from the addition of more refineries. A spokeswoman for the City of Claremont testified at the May 6 hearing on the Draft Tract Specific E.I.S. that "based on the ambient air quality State standards (0.10 ppm) there were 215 days last year [1974] over the oxidant level."

[Emphasis added]. Increased refinery activity will undoubtedly result in further degradation of present air quality and pose an undue burden upon local residents who must work and live in a polluted environment. Furthermore, the entire South Coast Air Basin is under mandate to develop an air quality maintenance plan to fulfill the requirements of the federal government for the long-term attainment of the national ambient air quality standards. It is incumbent upon the Bureau of Land Management to provide information about the effect of coastal leasing on these plans and standards.

There is little doubt that the quality of air in Southern California is far from reaching primary ambient air quality standards. Though some reduction of hydrocarbons and carbon monoxide emissions have been achieved, this trend is forecasted to be reversed as a result of stationary sources switching from natural gas to oil for fuel. A consulting firm, K.V.B. Engineering Inc., indicates that nitrogen oxide emissions in the South Coast Air Basin will increase by 15% by 1980. The Department of Interior must discuss where the petroleum recovered from Southern California O.C.S. development would be refined. Additional refineries in the South Coast Air Basin would impact our already degraded air quality.

We would therefore ask that the Department of the Interior slow the process of the oil leases long enough to do a thorough analysis of the national energy needs and to do an E.I.S. that follows the production of oil clear through the

refinery stage and the resultant environmental impact on the air quality of inland cities.

4. Economic Losses to Local Governments

O.C.S. development in Southern California will have a significant economic impact on local governments because of oil spills and increased municipal services for onshore related development activities. Yet the draft tract specific E.I.S. concludes, "The establishment of additional oil facilities will not have a negative financial impact on the operation of local government . . . industrial enterprises more than offset the cost of services needs by the amount of taxes generated." Draft Tract E.I.S., Vol. II, P. 277. We think this conclusion is erroneous.

In reaching their conclusion, the Department of Interior relies on two tax articles that conclude that industry generates a surplus of revenues for local government and another study by the California Builders Council which reaches the same conclusion. Only one source considers the specific impact of oil related industrial development, a study that looks at the small, unrepresentative town of El Segundo. The draft E.I.S. does not mention whether the study assesses the costs to surrounding communities of refinery activities in El Segundo.

Although Interior must certainly have been aware of them, two sophisticated economic evaluations of the impact of O.C.S. development on local government were not even mentioned in the

draft tract E.I.S. One study concluded that the State of Louisiana sustains net onshore costs in excess of assignable tax revenues of \$38 million per year in support of offshore operations beyond the three mile limit in order to provide services to people who work in federal waters. Gulf South Research Institute, Baton Rouge, Louisiana, Offshore Revenue-Sharing: An Analysis of Offshore Operations on Coastal States, ASRI Project No. X5-614. Texas has also recently released a study which estimates the potential costs to the state as a result of new O.C.S. leasing in the Gulf of Mexico. This study concluded that the net cost to state and local government in excess of new revenue will be \$52.1 million per year. Benefits and Costs to State and Local Governments in Texas Resulting from Offshore Petroleum Leases on Federal Lands (1974). We have discussed these two studies in considerable depth in our analysis of the draft program E.I.S. (see Analysis, pp. 256-273). We incorporate that discussion here and renew our plea for a review of the current distribution of benefits and burdens and consideration of the implementation of an equitable revenue-sharing system between the federal government and affected state and local governments, or, alternatively, institute a judicial or administrative scheme for the imposition of development charges upon the oil producers granted the privilege of O.C.S. development.

Interior's analysis of the economic impact of O.C.S. leasing on local governments is faulty in still another respect.

No mention is made of economic losses suffered by local government as a result of oil spills. We have already recounted, in our analysis of the draft program E.I.S. and elsewhere in this document, the enormous financial burden faced by Southern California coastal communities as a result of the 1969 Santa Barbara oil spill. The direct cost incurred by governmental agencies for cleanup operations, disaster monitoring, beach and offshore inspection trips, etc., was \$639,200. Mead and Sorensen, The Economic Cost of the Santa Barbara Oil Spill. Yet the Santa Barbara beaches are still contaminated. Oil stained rocks destroy the habitat of rocky intertidal organisms, while oil deposits buried in beach sand can affect the habitat of sandy beach organisms. It has been estimated that the total cost to clean up and restore contaminated rocks and sand on publicly owned parks, beaches and tidelands would range from \$11.8 million to \$30 million. U.R.S., Physical Assessment and Cleanup-Restoration Cost Estimate of Coastal Areas Contaminated by Material Related to the 1969 Santa Barbara Oil Spill Incident, 1974. Also, valuable beach sand was removed during cleanup operations. U.R.S., supra, estimated the value of sand on public land lost by 1969 cleanup operations to be in a range from \$185,960 to \$346,370.

There were also many indirect costs to local governments. Beaches owned by state and local governments diminished in property value and yielded interim rent and utility losses. These losses have been appraised at \$3.9 to \$5.1 million

for the State of California, \$2.6 to 3.2 million for the City of Santa Barbara, \$234,00 to \$326,000 for the County of Santa Barbara, and \$215,000 to \$280,00 for the City of Carpinteria. These losses, which range from \$6.9 to \$8.9 million do not include the cost of cleanup operations, nor do they include losses suffered by local governments in Ventura County. Affidavit of George Hamilton Jones in State of California v. Union Oil Company, No. 69-1068-RM, (United States District Court, Central District of California).

The State of California and local governments also suffered lost sales tax revenues because of lost beach use and lost tourism. The spill cost the State of California \$17 million in sales taxes, the County of Santa Barbara \$1.1 million in sales taxes and \$500,000 in property taxes, the City of Santa Barbara \$3 million in sales taxes and \$600,000 in bed taxes, and the City of Carpinteria over \$566,000 in tax revenues. These losses do not include losses by local governments in Ventura County. Testimony of A. Barry Capello, City Attorney of Santa Barbara, before California State Lands Commission, November, 1974.

Another environmental and socioeconomic impact of the spill was the diminution of public services to local communities. Reduced public services occurred as a result of re-deploying existing resources to handle the spill and of lost tax revenues. No value has been estimated for the loss of public services.

The draft tract specific E.I.S. does not consider these potential economic losses to local governments in a thorough and systematic manner. If it were to do so, the economic impact on coastal communities in the Los Angeles area, where beach use is many times greater than in Santa Barbara, would be awesome. The failure to consider these losses is particularly serious in view of the fact that Interior's high case estimates of oil spillage postulate the equivalent of one Santa Barbara spill per year. We urge that further analysis of the economic impact of O.C.S. development on local governments be made and that consideration be given to some form of an oil spill liability mechanism to compensate local government for losses that are sure to occur.

D. ALTERNATIVES INADEQUATELY CONSIDERED

1. The Alternative of Conservation

We believe that a comprehensive energy conservation program should be an essential part of any national energy policy. To that end, we presented Interior, in our analysis of the draft programmatic E.I.S., with extensive suggestions on how to implement such a program. See Analysis, pp. 46-117. Should a conservation program be seriously undertaken, the need for O.C.S. development would be substantially reduced, as would the pace of development.

An article appeared in the Los Angeles Times on May 11, 1975, entitled "It's Still Gluttony as Usual on America's Energy Front." The article begins its discussion of solutions to the energy crisis with the comment that "in its continuing struggle to devise a national energy policy, the United States has begun to resemble a fat man who plucks up his will power and resolves that henceforth he will order his hot fudge sundaes without whipped cream." No matter what alternative energy sources we choose to develop at the present time, concludes the article, there must be an "irreversible commitment to a progressively tougher regimen."

On Saturday, April 26, 1975 at the Beverly Hilton Hotel, Beverly Hills, Los Angeles, a one-day conference on the

energy crisis was sponsored by the Center for Law in the Public Interest. During the course of this conference, much time was devoted to the alternative of conservation.

Senator Gaylord Nelson, from Wisconsin, opened by stating that it is important for politicians to understand the environmental and economic problems involved in the energy crisis because this issue must be dealt with in the political arena. He suggested that the value of conservation can be seen in statistics such as the following: If automobiles were required to achieve an average mileage of 22 m.p.g., 675 million barrels per year of oil (equivalent to \$7.2 billion per year) would be saved. A requirement of 30 m.p.g. would cut consumption 50% or \$20 billion per year.

Indeed, stiff excise taxes could be assessed on the purchase of fuel-inefficient autos. The standard could get progressively stiffer, and be more ambitious than that favored by the Ways and Means Committee. By 1980, anyone buying a new car getting less than 20 m.p.g. might pay an extra \$400 or \$500 for the privilege. Purchasers of the real gas devourers might pay even more. The money could be used to finance rebates to buyers of the most energy-efficient vehicles -- whether foreign or domestic made. U.S. auto makers and their unions complain that such a tax and rebate system might lose them sales and jobs to imports. That argument would be plausible if the tax and rebate system were to be imposed immediately, but a phased-in system would give the auto makers ample time

to change their designs and marketing strategies.

Other measures to achieve conservation include mass transit, reduction of heat waste in buildings, and end to the monopolistic combination of industry. Controls on domestic oil prices could be ended sooner, rather than later, without resort to the tortuous formula some are suggesting. Present controls discourage investment in costly techniques for squeezing marginal production out of declining fields, and it makes little sense to pay higher prices to foreign producers than to domestic ones, when the cartel suppliers are beyond the reach of U.S. taxes and U.S. producers are not.

Ronald Doctor, Commissioner, California State Energy Resources, Conservation and Development Commission, stated that conservation is necessary and possible without disrupting the economy. The longer we delay, the greater the risks become. Furthermore, he indicated that policies must be directed towards increasing supply as well as reducing demand and in doing so through the least environmentally damaging alternatives.

Mr. S. David Freeman, Director, Ford Foundation Energy Study, stated that energy conservation "helps with every aspect of the problem" -- it buys time and saves money as well. He outlined four stages by which energy conservation can be achieved:

- (1) Recognize that we are stuck with what we have; thus, we must "retrofit" to produce small changes in existing structures and systems.
- (2) Establish increasingly stringent performance standards.
- (3) New energy-saving technology must be developed

and cannot be left up to the "free market system;" regulation is necessary. (4) Recognize that we need to shift from an orientation toward increasing the GNP to a system that includes recycling, durability, and changed lifestyles, -- we must experience growth in services and not in material production. Mr. Freeman stated that the most important point in this area is that we can uncouple energy from economic growth.

Robert Montgomery, General Counsel, Federal Energy Administration, set forth these criteria for a conservation program: (1) It must be effective -- substantial and immediate savings must occur. (2) These savings must be the result of greater efficiency (there is no need to sacrifice growth) and they should be compatible with increasing demand. (3) It has to be fair.

The conservation program must take a broader scope, i.e., not just transportation but industry and commercial users must conserve energy. In terms of fuel, fuel products other than petroleum, must also be conserved. Methodology must vary from mandatory to voluntary controls, to the use of economic incentives, depending upon the individual situation.

In response to the question of how to implement conservation programs, Senator Nelson responded that with mandatory controls big lobby interests come out ahead because they can "get around" the controls. The government says that gas consumption should be cut down, but it is unwilling to "take on Detroit;" it expects voluntary cutbacks on an individual basis.

We need mandatory conservation and political leadership as well as voluntary conservation. These are both lacking.

At the hearings held on the draft tract specific E.I.S. on May 6, 7 and 8 of this year, Mr. Joe Edmiston of the Sierra Club addressed the issue of solutions to the energy dilemma. He stated that increased offshore production has an important place in a comprehensive national energy policy. It must, however, follow the imposition of strict energy conservation measures and a national energy policy that places prime reliance upon energy conservation as the means of obtaining additional freedom from foreign imports.

In addition to focusing upon the importance of an effective conservation policy, Mr. Edmiston mentioned other alternatives which must be incorporated into a total energy scheme in order to solve the energy problem. These include a moderate program of leasing in already impacted areas of the O.C.S. (starting in the Gulf of Mexico), coal conversion of power plants (using the low-sulphur coal that can be deep-mined in West Virginia), increasing secondary and tertiary recovery of existing fields (onshore and offshore), together with a continuation of some imports. Use of all these alternatives may give this country an energy alternative to massive O.C.S. leasing.

2. Alternative Energy Sources

The dialogue between interested public agencies

and the Department of Interior which began in Santa Monica in 1973 and continued in Beverly Hills in 1975 placed a strong focus on the possible utilization of alternative forms of energy. Indeed, we believe that there are other alternatives available which could help to solve the energy crisis.

The draft tract specific E.I.S. devotes 89 pages to a discussion of all the alternative actions which might be available to the federal government. The discussion but briefly discusses other energy sources, then speeds on to consider such alternatives as delaying the sale or choosing other alternative O.C.S. areas.

Other energy sources are described in only 38 pages. Within these few pages are contained many possible sources including coal, hydroelectric power, nuclear power, solar energy and various other sources. The sufficiency of this analysis is open to serious question.

NEPA requires that the relevant governmental agency consider viable alternatives to the proposed federal action. Volume 2 gives but a cursory account of other alternatives available. Interior's treatment of the issue indicates a lack of interest in other sources and a decision to go forward with O.C.S. development.

There is a large body of scientific research available on many of these alternative sources. Very little of this scientific material is included in the draft tract specific E.I.S. Recent studies by scientific organizations have focused

on the alternatives of geothermal and ethyl alcohol as possibilities for energy production, but these alternatives are touched only very briefly in the draft tract specific E.I.S.

Possible energy alternative sources were also discussed at a Conference on Offshore Oil held at the Beverly Hilton Hotel on Friday, March 21, 1975. At that conference, Mr. Leonard Meeker asked about the level of federal funding for renewable energy sources with a special focus on solar energy. The internationally renowned diver, Jacques Cousteau, replied that it was his opinion that the relevant governmental authorities had diverted the issue of solar energy to considerations involving the heating and cooling of houses, when, in fact, the real problem in order to solve the energy crisis was the production of great amounts of energy through the avenue of huge solar producing plants. Jacques Cousteau stated that in order to develop this potential the U.S. would need a financial commitment for the first year of 10 billion dollars which would eventually amount to a trillion dollars within a ten year period. Undersecretary Hughes of Interior at this same conference replied to this question with the information that the federal government is presently spending 153 million dollars for all other alternative sources. He stated that the government was in no position to spend billions or trillions of dollars for alternative energy development.

Mr. T.L. Wright, a Petroleum Geologist, at a conference sponsored by the American Assn. of Petroleum Geologists held

aboard the Queen Mary, on April 25, 1975, suggested several sources that should be considered in a total energy picture. Mr. Wright suggested that there will be room in an energy solution for more foreign oil imports than Congressional Committees predict, because it is his opinion that some energy exporting countries such as Iran and Venezuela have nothing else to offer the U.S.

At the conference held on April 26, 1975, sponsored by the Center for Law in the Public Interest, Michael McCloskey, Executive Director, Sierra Club, presented a different perspective on this issue of trade-offs. Since the impact of nuclear power production will continue into the future (500,000 years) we must consider the moral question of our responsibility to future generations. "They should be in on the vote." From this perspective, he sees coal as the most viable energy source. Production of coal forces us, rather than future generations, to pay the price of what we get.

In discussing the potential of nuclear power production, John F. O'Leary, former licensing director of A.E.C., described the overwhelming public rejection of nuclear power production and the problems of safeguards, storage and safety. In terms of safeguards and the possibility of diversion, he pointed out that the opportunity is already available; that "the genie is already out of the bottle." He considers the problem of storage as soluble, particularly because the use of breeder reactors can result in the production of radioactive waste with a half life of only 30 years instead of 500,000. He stated that

safety problems too are being solved.

This analysis has done a brief survey of new developments in the areas of alternative sources available as solutions to the energy crisis. We continue to contend that the main answer lies in an effective conservation program. However, conservation alone will not solve the energy problem. The government must continue to investigate alternative sources. These sources must include secondary and tertiary recovery from old oil wells, solar energy, geothermal energy, and new energy forms such as the use of waste products and the use of waste oil.

3. Splitting of Exploration and Production

We also believe that a viable alternative within the proposed agency action is splitting exploration activities from production activities with respect to leasing. That is, the federal government would retain title to the tracts until after exploration revealed the extent and value of the resource; only then would the tracts be leased.

The advantage of such a leasing system is that it accommodates a legitimate national interest in determining what resource exists on the O.C.S. before an irreversible commitment of resources is made to the oil industry for commercial production. The government is thereby enabled to make intelligent decisions about the pace of development, rather than an all or nothing

decision in ignorance. The public is also enabled to make intelligent policy input about production alternatives. The split leasing system could be initiated by the Interior Department without legislation. Some criticize the approach, however, because it means getting government into business, assuming risk, etc. That need not be so if the government were to lease areas for exploration, giving the exploring company preference rights to produce, nor need the same system be used everywhere. The modified leasing system could be utilized only in those areas where the risk-management arguments are less compelling.

Necessarily, one result of the uncertainty about the right to produce would be to lower the front end bonus bids. Royalty percentages upon production could be increased, although that too would lower the front end bonus bid. Yet that alteration in the bonus-royalty system would have two salutary effects. Lowered front end bonus bids would stimulate competition by reducing barriers to entry by small independent firms. Secondly, lower front end bonus bids would free more capital for further exploration because there would be less going in on the front end. We think the merits of this system would not only enhance exploration and production, but permit greater planning and intelligent decisions about leasing.

E. MITIGATION MEASURES NOT FULLY CONSIDERED

1. No Nearshore Drilling

Lease Sale 35 proposes bidding for leases and acceptance in 1975 with immediate exploration and development of shallow water tracts. Deep water tracts will also be leased but their development will follow some five or more years after the shallower water areas. The lease schedule is as follows:

"Early exploration would be expected to begin in the Santa Monica and San Pedro Bay areas where an estimated 30 to 60% of the recoverable resource (oil and gas) lies. Also a large percentage of the area is in platform depth (under 800 feet) and production could be underway in two to three years.

"The Santa Rosa Cortes area (north) is expected to be next in line for development. The final stage of development would be expected to take place in the Santa Barbara/Santa Catalina area and lastly the Tanner/Cortes Banks which is the furthest area from the shore. These last two areas are estimated to be rich in oil deposits but approximately 75% of the area is in very deep water. Draft Tract E.I.S., Vol II, p.286-287.

We believe that the proposed timetable should occur in exactly the opposite order, with development first in those areas furthest offshore and furthest away from impacted recreational and commercial coastline uses. We further believe that the risk of drilling to environmental and recreational values in nearshore areas, especially Santa Monica Bay, is so great that no drilling should ever occur there and even if drilling should occur there, the reverse order lease schedule would permit additional time to fully explore and understand the environmental effects of drilling in these precious areas.

Of particular significance regarding the proposed lease

schedule is the fact that a minimum adequate baseline data survey for any of the proposed areas will take at least five years. Meantime, money will have been paid and vested rights acquired to the leased tracts. Regardless of what the biological survey finds, the recommended mitigation measures for special protection of natural resources after leasing are limited to alternative placement of structures within the leased tract at the discretion of the oil and gas supervisor and the requirement that, in cases of oil spill, containment equipment shall be deployed unless the supervisor modifies this requirement. As a practical matter, then, once the resource is leased, exploration and production become matters of right and environmental control regulations must be tested against the (government granted) right to get the oil out of the earth.

Environmentally, what does this mean to the coastline? Two agencies with planning authority for the coast, the State Water Resources Control Board and the South Coast Regional Coastal Commission, have developed classifications to denote the relative value of the shoreline ecosystems in Southern California. Three "areas of special biological significance" have been set aside in areas that would be impacted by a possible spill. The E.I.S. details this problem and includes the Channel Islands, mainland coast from Mugu Lagoon to the northeast corner of Santa Monica Bay (the Malibu coast), and Newport Beach south to Dana Point; also in danger would be the Point Fermin area and Anaheim Bay.

The Water Board has found in these areas "biological communities of such extraordinary, even though unquantifiable, value that no acceptable risk of change in their environment as a result of man's activities can be entertained." Correctly, the E.I.S. concludes that "even a small spill would greatly impact an ASBS [Area of Special Biological Significance] if it went ashore. . ."

The South Coast Regional Commission found that "the coastal marine environment of the South Coast Region (Los Angeles and Orange Counties) ranked as one of the world's most biologically productive and useful." To preserve this environment, they recommended as part of the Coastal Plan that a system of marine parks and preserves be established to protect these environments of state-wide significance. The Malibu coast--recommended for preservation--would be immediately adjacent to the Santa Monica Bay lease area. Likewise, the Palos Verdes preserve recommendation would be endangered by the Santa Monica Bay proposal. The Central Orange County Marine Park and Preserve proposal would be next to the Santa Catalina Gulf lease area. For Catalina Island with its "relatively intact natural productivity" in the "intertidal and nearshore environment," the Commission recommended maintenance in its natural state; kelp beds and reefs and islets are included as sanctuaries for sea birds and marine mammals. A lease sale is proposed adjacent to Catalina and surrounding two sides of the Channel Island National Monument.

Oil platforms and associated development, to say nothing about the threat of oil spills, will interfere with the

views from Dana Point, San Mateo Point, and Crescent Bay cove--all areas where viewpoints have been recommended for purchase by the South Coast Regional Commission. Indeed, the entire issue of aesthetic impact--while subjective--is very real as a critical impact upon the residents and visitors to our coastal zone. The shoreline is a special scenic place where the feeling of openness and uncluttered vistas is viewed as a precious and irreplaceable resource.

We believe that no drilling should take place in nearshore areas, particularly in Santa Monica Bay. Rather, if drilling is to take place at all, we recommend that it take place in those areas furthest away from the population centers. This criterion would establish the Tanner/Cortes Bank area as the most favorable for O.C.S. development.

The decision as to which areas shall be subject first to O.C.S. development is dependent upon a systematic analysis of the standards by which Interior intends to establish priorities on this matter. Dr. William Ménard of the Scripps Institute of Oceanography has made a substantial attempt to fully articulate this issue. Dr. Ménard, in discussions regarding the appropriate system for establishing priorities for development of O.C.S. leases, comments first on the CEQ ranking system. The CEQ has developed a system which works on the theory that the regions most apt to suffer environmental impacts from off-shore drilling must be given the lowest priority. Using this principle, when one considers all the possible national areas for

O.C.S leasing, drilling in the Gulf of Alaska is the most hazardous and, therefore, is the least desirable. This result is obtained because the possibilities of environmental impact from earthquakes, storms, and other natural occurrences are greater in the Gulf of Alaska than in any other national area. In addition, the CEQ method of ranking yields the fact that the East Coast of the United States is the most desirable place for drilling. Georgia is given the highest priority for O.C.S. drilling.

Although Dr. Ménard is of the opinion that the CEQ listing is reasonable, he suggests that perhaps the relevant agencies should consider different methods to order environmental impact. For the purposes of this analysis, a very brief summary will be given to an alternative method which Dr. Ménard advocates, entitled Perceived Environmental Forecast (PEF). Further information on Dr. Ménard's theory could of course be obtained from the source himself.

Dr. Ménard prefers the methods by which "acousticians measure things." Acousticians don't just measure noise in the absolute. They measure relative noise. They measure noise over background. They evaluate something called the Noise Exposure Forecast (NEF). In practical terms, an example of the use of a system similar to NEF is as follows: When one is considering a runway for an airport, one should consider which environment will be impacted by such a runway. It will make a difference whether or not the runway passes over a home for the deaf or whether it passes over a school. Of course, this comparison

highlights the fact that a runway over a home for the deaf is not as likely to cause impact in the noise level to the inhabitants of such a home as it would cause to the residents of the school. However, even in regard to the school, if the runway were to only impact that particular building during those hours when the school was not in session, there also would be no significant impact on the school. The point of such an analysis is that the decision is based on the relative impact caused by any given development. Analysts trained by this method identify such factors as the number of people that would be impacted by the development and how close the people are to a certain intensity of noise and how those people will be affected by that noise.

It is Dr. Ménard's contention that such a system could be developed to analyze more effectively the relative impact of the tracts that are proposed for O.C.S. development. Dr. Ménard states his conclusion in this fashion:

"The assumption is that everywhere there is an environment, there are people enjoying it or making a living from it or both. One says then that the important--one of the very important things--is how many people are there and how far away are they? How often does the insult occur, and how rapidly does it occur?"

Dr. Ménard has stated that using such method would result in a different system of priority for the O.C.S. areas off Southern California. He has concluded that in considering drilling off Santa Monica Bay by this method ". . . you can see that nobody would have ever proposed any drilling off the Santa Monica Bay with the millions of people that are inside that area

everyday." Dr. Ménard has also stated that Santa Monica Bay is the last place in the United States that the Department of the Interior should drill.

We believe that there should be no drilling in Santa Monica Bay and, if drilling is to occur anywhere, it should occur in the areas furthest away from the shore--the Tanner/Cortes Bank area. We base this argument on analysis of factors such as those asserted by Dr. Ménard for a change in the methodology involved in establishing priorities. If principles such as Dr. Ménard advocates are followed, O.C.S. development might be acceptable in the Tanner/Cortes Bank area, but would never be acceptable in the Santa Monica/San Pedro Bay areas.

It is our understanding, moreover, that at the present time U.S.G.S. has accumulated adequate data for O.C.S. development only on the area that is bounded by the Tanner/Cortes Bank tract. It is our understanding the U.S.G.S. has completed half of a project to thoroughly map this area of the Tanner/Cortes Bank. It is the intention of the U.S.G.S. to complete this project by the end of this summer, 1975. It is also our understanding that the U.S.G.S. intends to do similar studies for the other areas contemplated for O.C.S. development once this study is complete. For the purposes of this agency, the prime value of the U.S.G.S. studies is that this material is disseminated to the public in general. With such material in hand, interested agencies and other organizations would be availed of the opportunity to comment intelligently

and knowingly on the proposed areas which Interior intends to lease. This office is also well aware that the U.S.G.S. is faced with a tremendous undertaking if this requirement is made mandatory upon them. At the present time, the relevant office of the U.S.G.S. in Menlo Park, California, has at its disposal, full-time, only one oceanographic ship. It is our understanding that officials of this agency are now negotiating in Washington for additional ships. It is also our understanding that some other institutions in the area such as the University of Southern California will make available to the U.S.G.S. their equipment on a part-time basis. Only when relevant data has been compiled, and we have greater experience with offshore development should there even be consideration of leasing in the especially sensitive nearshore areas.

In conclusion, regarding the priority to be established for the leasing of Southern California O.C.S. lands if, indeed, leasing is the answer to O.C.S. development, it is our position that leasing must take place first in those areas furthest away from population centers. We request also that the U.S.G.S. be required to do a thorough seismological and geological study on all the areas that are being considered as possible leasing tracts. This information accumulated by the U.S.G.S. should be made available to all interested public agencies. Once all this information is gathered, and other relevant academic bodies and interested agencies have had the opportunity to comment on other criteria which must be included

in an analysis of priorities, only then consider the feasibility of drilling in nearshore areas such as Santa Monica Bay, although we believe such areas should either never be leased or only in emergency circumstances.

2. Economic Guarantees to Local Governments

We have outlined the severe economic costs suffered by local governments as a result of oil spills and as a result of increased municipal services for onshore related development activities. We believe that relief from these economic burdens should be provided. We are aware that Congress is considering various energy reform legislation which addresses this problem. Possible solutions include an oil spill liability contingency fund, and no fault strict liability policy for oil spills, and revenue sharing to offset costs of added municipal services. We are further aware that government and industry are not opposed in principle to such measures and are indeed actively considering their adoption. But we do believe that these economic issues should be fully resolved before any lease sale takes place, for after that event it will be impossible to alter the terms of the lease.

3. Improved Drilling Regulations and Containment Capability

Before beginning an updated analysis of recent develop-

ments surrounding the questions of regulations and management, we recommend to the Department of the Interior that it reevaluate the comments that we made on these issues in our analysis of the Draft Program E.I.S. presented in February, 1975. At that time we took considerable efforts to comment on the fact that, to the present date, regulation of leases granted to oil companies by the Federal Government has not been characterized as either efficient or equitable. We recognize, of course, that since the time the first exposures of inadequate regulations were published, that significant changes have taken place in the relevant agencies of U.S.G.S. We are encouraged to see these signs of awareness and change on the part of the U.S.G.S. However, we must persist in our efforts to ensure that not only are regulations themselves more carefully formulated, but, also, that these regulations are adequately enforced so that, indeed, they are effective.

In the recent conferences and hearings concerned with O.C.S. development, many spokesmen for the oil industry have focused on the problem of safety. This problem, of course, centers around the issues of regulation and management. The Santa Barbara oil spill stands as a reminder to the need for safety.

Oil spokesmen for the industry have stated that there are revised O.C.S. orders which have been published by Interior. These new orders contain such constraints as frequent inspections and other safe technical guidelines. We are also informed that the Americal Petroleum Industry, on its own initiative, has

developed RP's ("recommended practices") which concern such matters as control of safety devices on platforms and other safety maintenance items in the production of oil itself. It is the position of the oil industry at the present time that these two factors insure that oil drilling today will be "as safe as man can do at the present time."

Oil industry spokesmen have also been concerned with the problem of the capability of the oil industry to contain and clean up oil spills. Training programs concerning these areas have sprung up both in the Gulf states and in California. A training school took place in California this year which focused on blow out prevention. The training includes the use of well-kick simulators.

The oil industry has also spent considerable time and effort in developing increased contingency planning to cope with oil spills. Clean Seas Inc., is an organization of 16 oil companies which has an operating budget of \$800,000, its operations built on a theory of rapid response to oil spills. This corporation has bought several ships and other vehicles that are used in quick cleanup. One spokesman for the industry has said that industry capability to cope with oil spills has increased 100% since 1969.

With respect to containment, however, technology is still not able to deal effectively with massive oil spills such as the Santa Barbara spill, particularly in heavy seas. We also note the importance of containment readiness capability.

At a recent conference on offshore drilling at the Los Angeles Museum of Natural History, Mr. Robert Ornstein of Seashore Environmental Alliance noted that no facilities for containment now exist south of Point Dume. Improved regulations must ensure the presence of containment capability.

We recommend further research, moreover, on both the effectiveness of the regulations that the U.S.G.S. has now proposed and on the proposed system of enforcement for these regulations. We also encourage Interior to discuss these matters with the California Division of Oil and Gas which administers the state-owned lands which produce oil for California. This agency has developed extremely efficient regulations and enforcement of regulations for the monitoring of these oil wells on state lands.

Offshore regulations of this agency include requirements and procedures for casing, setting depths and cementing, blowout prevention, drilling fluid, abandonment, well identification, and injection projects. Prior to drilling or altering a well, the operator must file a proposed program with the division for approval. If the proposed work is approved, specific performance tests to demonstrate compliance with the regulations are required during certain phases of the operation, and these tests are witnessed by a representative of the division.

The regulations also require that each offshore producing facility be equipped with integrated pollution-prevention and safety systems to close off possible pollution sources in case of trouble. Equipment to shut in wells, producing equip-

ment, and pipelines are activated automatically when pre-set abnormal conditions of pressure, fluid level, gas concentration, or fire are detected.

In addition to well and production facility inspections, monthly surveillance flights are made over the offshore portions of Los Angeles and Ventura basins. During the flights, which are made in cooperation with the State Department of Fish and Game, each offshore drilling or producing facility is inspected and photographed, and natural seep activity is monitored.

Since 1896, there have been over 4,000 wells drilled into California's territorial waters. During 1974, there were an average of 2,244 active offshore wells of which an average of 1,579 wells were producing. The peak year was 1969 when an average of 1,916 wells were producing. To date, none of these wells has been the source of a major pollution incident.

The California State Lands Commission which administers state tidelands oil development has promulgated very strict regulations for the use of state lands. These regulations are expressly designed to give equal consideration to both the business community and the environmental community. But the main thread in the design is the public benefit.

This State Lands Commission is devoted to three basic policies when it comes to granting oil drilling permits or leases on State tidelands. First, the Commission wants to know it's safe; that is, that the operator abides by every drilling procedure and regulation the State mandates. The Commission also

wants to know that the operator has the containment capability to recover any spillage or leakage that may occur. Accidents can happen, but the Commission wants to be assured that everything possible has been done to prevent one. The Commission also wants stronger-than-words assurances that the people who work on the offshore rigs have been properly trained to do their jobs.

To carry these policies, the Commission has adopted new procedures. The procedures include requirements for well-casing, blowout prevention, drilling mud programs, and facility safety inspections. Platforms must be equipped with integrated safety-control systems that will cause shut-in of all wells in the event of fire, pipeline failure, or other catastrophe. Well-control training will be conducted daily until each crew is thoroughly trained, and thereafter at least once each week for each crew. The company drilling supervisor will be responsible for instructing all drilling crews in blowout prevention and procedures. In addition, company and contractor supervisors are required to attend on an annual basis a formal blowout control training school.

Special emphasis on mitigation of oil spills has been written into the procedures. This does not mean that the Commission anticipates oil spills. The best of efforts may still fail, however, and there may still be some oil on the water. Plans must be made to minimize that possibility. There is therefore a contingency plan -- it is a plan designed to provide an outline of appropriate action to be taken in the event

of a spill. It discusses: 1) initial abatement of an incident, 2) reporting methods, and 3) containment and cleanup of oil spills.

The Commission is aware that these procedures will add cost to the production of oil -- both to the industry and to the State -- but safety is the overriding consideration. Such procedures will get crude oil out of the ground -- and will do it with minimum risk to the environment -- not planned disaster, as some may think, but planned conservation.

The Commission also wants the operator's liability for damages clearly spelled out. If a spill should occur, or even a damaging leak, the operator should be required to pay for any damages that result -- and this principle should be firmly agreed upon before drilling begins. After the infamous Santa Barbara spill, it was almost six years before the oil company paid damages. The out of court settlement finally came about only after many lawsuits had been filed, and much of the original recovery work done by others. From now on, the State should demand advance recognition of liability on the part of the lessee for any accident or spill that occurs during operation.

We would hope that Interior would give consideration to adopting more stringent drilling regulations such as those used by the State Lands Commission, regulations which may well prevent another Santa Barbara-style oil spill disaster.

F. CONCLUSION

The purpose of this analysis is to raise questions not addressed, or inadequately treated, in the draft tract specific E.I.S. for Southern California O.C.S. leasing. Based on our analysis, however, we have arrived at the following conclusions:

1. An additional opportunity to comment on the tract proposal must be provided after release of the final program E.I.S. for expanded O.C.S. development nationwide and a decision to go forward with the national program.

2. Issues relevant to O.C.S. development nationwide and in Southern California must be adequately dealt with in either the program or tract document; these issues include the need for a coherent national energy policy, discussion of relative environmental impacts of O.C.S. development nationwide, degradation of air quality, onshore land use impacts, and coordination with the California Coastal Zone Conservation Commission.

3. We do not have sufficient data regarding our marine and coastal resources, and the potential impact of O.C.S. development on those resources. Studies providing the necessary data should be conducted prior to any decision being made regarding expanded O.C.S. development.

4. The cumulative environmental impact of all energy related development in Southern California needs to be considered.

5. Five geographically and environmentally dissimilar areas in Southern California warrant separate treatment.

6. The economic and environmental consequences of O.C.S. development are not fully understood. To better understand the potential impact of O.C.S. development, attention should be given to the 1969 Santa Barbara experience.

7. The air quality and land use impacts of expanded O.C.S. development and the growth induced by that development have not been adequately analyzed.

8. The economic losses to local governments from oil spills and increased municipal services is inaccurate and incomplete.

9. Alternatives not thoroughly examined are conservation, other energy alternatives, and splitting exploration from production.

10. Consideration should be given to a moratorium on development in nearshore areas until more complete information on the impact of O.C.S. leasing has been developed.

11. The public should be compensated for diminution of property values, and loss of marine and recreational resources resulting from O.C.S. development. Local government should be compensated for economic losses resulting from oil spills and increased municipal services for onshore related activities.

12. More improved drilling regulations and containment mobilization capability should be required.

We request the Department of Interior to provide an additional opportunity to review the tract document after completion of a final, legally adequate, program E.I.S. for accelerated leasing nationwide and a decision is made to go forward with that program. We recommend that baseline information studies be completed and that further research be done on the unknown environmental consequences of O.C.S. development. Finally, we urge Interior to prepare, recirculate and consider a new draft E.I.S., giving careful attention to the issues raised in this analysis. Only then will the mandates of NEPA be satisfied.

PART TWO:

SCIENTIFIC ADVISORY COMMITTEE REPORTS

PART TWO

SCIENTIFIC ADVISORY COMMITTEE REPORTS

Members of the

Scientific Advisory Committee

- Dr. Richard L. Perrine, Chairman, Department of Environmental Science and Engineering, U.C.L.A.
- Dr. James N. Pitts, Jr., Director, University of California Statewide Air Pollution Research Center, University of California, Riverside
- Dr. Barbara J. Finlayson, Department of Chemistry, California State University, Fullerton
- Dr. I. R. Kaplan, Department of Geochemistry, U.C.L.A.
- Dr. James H. Whitcomb, Seismological Laboratory, California Institute of Technology
- Dr. Malcolm S. Gordon, Director, Institute of Evolutionary and Environmental Biology, U.C.L.A.
- Dr. J. T. Enright, Department of Biology, Scripps Institute of Oceanography
- Dr. David Chapman, Department of Botany, U.C.L.A.

I. AIR QUALITY

An Evaluation of Portions
of the Draft Environmental Statement,
Proposed 1975 Outer Continental Shelf
Oil and Gas General Lease Sale,
Offshore Southern California

Dr. Richard L. Perrine
Professor of Engineering and Applied Science
and
Chairman, Environmental Science and Engineering
University of California,
Los Angeles

May 15, 1975

The evaluation has been prepared in response to a request originating with the City of Los Angeles. It will address several separate elements of the Draft Environmental Impact Statement. In summary, the Statement is a vast compendium of information. Most of the information (within my areas of competence) is correct and pertinent to policy decisions regarding offshore oil development. However, some strongly biased statements also are included. Perhaps of greatest importance, there is a failure to provide any logical development of clearly stated policy alternatives within the documents. The inference is of small, fragmented environmental and other adverse impacts, and the single important favorable impact of a newly available source of energy. Discussion of specific elements of the Statement is presented below.

Demand Forecasts: The Need for the Resource

The discussion on pages 290 and 300-310, Volume II, relies on out of date information gathered and published earlier (as by the California Resources Agency in January of 1973). It should be known that these data are no longer valid; they are simply a residue of our historic growth boosterism.

There is a very substantial amount of energy demand reduction which is both feasible and economically justified. One concrete example of what can be accomplished is the savings in natural gas consumption obtained by Los Angeles County through deliberate energy management in their Civic Center Plaza buildings in Pomona. As reported to the County by Mr. Kenneth L. Minor, Senior Energy Systems Engineer, Southern California Gas Company by letter of March 26, 1975, 1973 and 1974 usage

of natural gas compares as follows:

	<u>Actual 1973 Usage, Mcf</u>	<u>Actual 1974 Usage, mcf</u>
January	1,842.3	1,466.0
February	2,244.1	1,516.0
March	2,488.6	828.5
April	2,458.0	778.0
May	2,265.7	648.3
June	1,583.7	648.1
July	945.9	528.3
August	1,934.0	464.4
September	1,476.1	545.6
October	1,788.3	503.0
November	1,878.9	778.4
December	<u>2,476.7</u>	<u>1,053.3</u>
	23,382.2	9,757.9

Mr. Gerald Reed, Manager, Programming and Standards, Mechanical Department, Los Angeles County, reports that this dramatic reduction was accomplished at a cost for control systems of less than \$500, and so a net annual savings greater than \$13,000. The buildings functioned in their normal manner throughout this period. Similar impressive reductions have been documented by County agencies in electric energy consumption where there has been an honest concern.

Transportation accounts for an unusually large fraction of the Los Angeles energy demand. It takes time to modify a transportation system. Thus while the immediate savings feasible in other sectors

perhaps are not possible, changes within the time frame envisaged for development of offshore oil production are easily achieved by modification of our transportation system. The Rand Corporation report, "How to Save Gasoline: Public Policy Alternatives for the Automobile," Sorrel Wildhorn, et al., R-1560-NSF, October 1974, catalogs the mix of new technology and policy which in their view is most reasonable and what savings can be accomplished by its implementation. Our own recent work, "Transportation: Is There a Choice" (a substudy from "Population and Energy in Los Angeles: The Impact of Different Rates of Growth on Transportation, Air Quality, Housing and Open Space"), Environmental Science and Engineering, UCLA 1975, in a similar fashion indicates the extent to which traditional demand forecasts may be obsolete. We find that even without introduction of any new technology, and with no loss in personal mobility, it is possible by 1990 to reduce per capita energy needs for transportation by about 40%. Technological gains could carry us well beyond this point should we really wish to consider feasible alternatives. Of course, purveyors of fuel are not likely to press for such a relaxed-demand future. But at present there is a sufficient body of information suggesting that there can be jobs, comfort, less congestion and greater individual choice through less energy-intensive futures that any serious attempt at evaluation should at least reflect these possibilities.

The Impact Statement as written, with unjustifiably high growth rates for energy demand, incorporates an exaggerated sense of urgency. There is honest need for new energy resources. But it is not as pictured. The exaggerated picture, in turn, leads to pressure for rapid leasing of offshore resources as contrasted with managed, prudent and relatively

risk-free development.

Impact on Air Quality

The language of the content included within pages 183-189 of the Impact Statement infers that no significant adverse effect on air quality would result from either routine OCS operations or as consequences of an accident. Yet the actual data included lead to a directly opposite conclusion.

Consider the likely consequences of a spill on a lesser scale than the Santa Barbara Channel spill, such as 1000 barrels per day, but located shortly beyond the three-mile distance from the Santa Monica-Palos Verdes shoreline. The Statement properly notes that as much as one third of this spilled oil, if not burned on the sea surface, would volatilize and become an air pollutant. The remaining approximately two-thirds of heavier ends would be moved across the sea surface, broken down by bacteria and/or dissolved in the water column, if not recovered.

But of the volatile share of the spilled oil, essentially all would constitute photochemically reactive hydrocarbons (all except C-1 to C-3 hydrocarbons). Contrary to statements made, many of the most common atmospheric conditions would sweep this material onshore to form an enlarged, but not dispersed plume traversing the air basin. Typical trajectories could carry the giant plume north and slightly west into the eastern San Fernando Valley, or north and then eastward toward Pomona and beyond ("Research Investigation: Air Pollution and City Planning, Case Study of a Los Angeles District Plan," Environmental Science and Engineering, UCLA 1972).

Because of the amount volatilized, the reactive hydrocarbons in the atmosphere from a major (1,000 barrels) spill could easily constitute 50 tons per day; fully 25% of the largest quantity estimated as small enough when released within the air basin to meet Clean Air Act requirements ("The Impact of the Energy Crisis and Estimates of Future Air Quality," Environmental Science and Engineering, UCLA 1975). But the plume would traverse a much narrower path than the dispersed fumes from auto exhausts over the entire air basin and the other usual sources. Thus the air quality impact of a large spill would be an order of magnitude or more worse than the 50 tons per day of ordinary emissions. That is, within the area contacted by the downwind plume, atmospheric conditions would likely be similar to basin-wide emissions of more than 500 tons per day of reactive hydrocarbons. And more unfortunately, these emissions likely would be accompanied by a relative shortage of nitric oxide, a pollutant itself but one which throughout much of our atmosphere has the virtue that it scavenges oxidant. Thus the downwind air quality effects at a moderate distance from a major spill, or even moderate-sized incident, deserve careful analysis and consideration. Techniques are available; they just have not been applied in the preparation of this Impact Statement.

The Availability of Qualified Manpower

A substantial portion of the Environmental Impact Statement under the heading of "Mitigating Measures" discusses regulation to avoid adverse consequences, enforcement of regulations, and spill contingency plans. All the contents of this section have little meaning unless fully qualified individuals are available at all times, as needed to staff OCS activities.

Unfortunately, the petroleum industry historically has not seen fit to staff until the need was urgent and immediate. A direct consequence of this method of operation is that for nearly 20 years, education for petroleum production-related activities has languished in the doldrums. Such preparation has been provided only in a limited number of schools, and in many of these only within small, weak and understaffed departments. There is no academic incentive strong enough for this to change. Recent discussion has brought out that if current proposals are to be implemented, including proper staffing, we somehow need to telescope about 20 years-worth of educating and experience-gathering into a several-year time span. We need this much of our recent past production rate of qualified professionals right now---not years hence ("The Appropriate Pace of Offshore Drilling," paper by Dr. Jack White and discussion, Conference on Offshore Oil, American Enterprise Institute for Public Policy Research, March 1975). The shortage of qualified individuals preparing for the industry has been a subject for debate year after year at Society of Petroleum Engineers meetings. Little change has yet occurred.

Again, unfortunately, time is needed both for basic educational preparation and to gain real working experience before individuals are given responsibility for complex offshore operations. To jump into operations without this needed reservoir of talent is the single action most likely to lead to large scale spills or other disasters. This means that a prudent policy would involve a carefully managed deliberate growth of OCS activities, recognizing these constraints, not an instantaneous jump to the OCS tomorrow. The Impact Statement shows no evidence of concern for these well-understood facts.

A proper, well thought out mix of OCS energy development activities with development of alternative sources, and conservation, could minimize pressure within these critical manpower areas. For example, almost nothing has been done to encourage enhanced recovery from already-discovered oil fields. While manpower is needed for this activity, too, and it must be properly trained, the requirements are nowhere near as severe. Environmental safeguards needed are much less restrictive. Equipment and specialized help can be made available much more easily in case of need. Perhaps of greatest importance, substantially different sources of manpower can become useful. Thus nowhere near as critical pressures are involved.

This discussion leads naturally to consideration of material included under the heading "Alternatives to the Proposed Action." Many alternatives are listed, but evaluation is sufficiently uneven that there is no opportunity to make a fair comparison of alternatives without a very great deal of additional work. The implied assumption is obvious, and brings us back to the inferences of the demand projections noted earlier---presumably there will be no limit to future American energy waste; therefore we must produce from every available energy source with minimal concern for any adverse consequences.

I AIR QUALITY

An Assessment of the Air Quality Aspects of the

"Draft Environmental Statement" for the
Proposed 1975 Outer Continental Shelf Oil and Gas
General Lease Sale Offshore Southern California

and of the

Analysis of Draft Environmental Impact Statement
Regarding "Proposed Increase in Acreage to be Offered for
Oil and Gas Leasing on the Outer Continental Shelf"

by

James N. Pitts, Jr., Ph.D.
Professor of Chemistry and Director
University of California Statewide Air Pollution Research Center
University of California, Riverside, CA

Barbara J. Finlayson, Ph.D.
Assistant Professor of Chemistry
California State University
Fullerton, CA

May 19, 1975

SUMMARY AND CONCLUSIONS

This report was prepared in response to a request of May 7, 1975 from the Office of the City Attorney, City of Los Angeles, for comments on the treatment of the potential impact on air quality of offshore oil drilling and related operations presented in

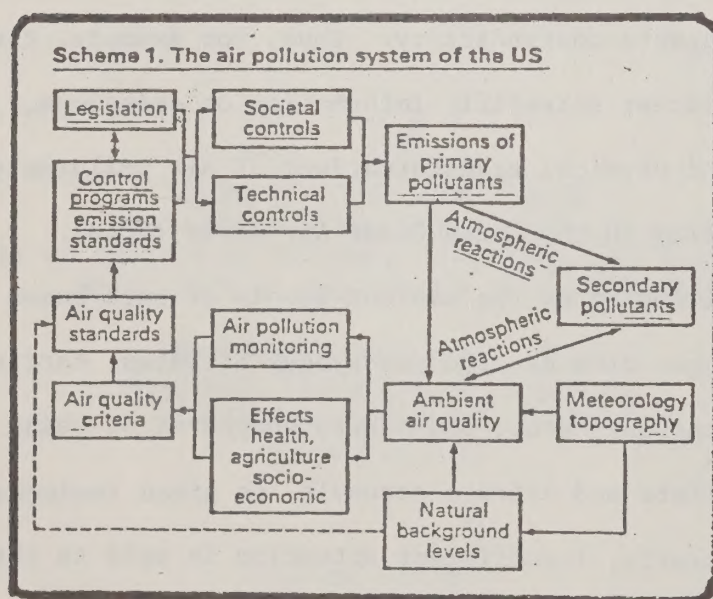
- The Draft Environmental Statement (EIS), Volumes 1-4 for the proposed 1975 Outer Continental Shelf Oil and Gas General Lease Sale Offshore Southern California prepared by the Bureau of Land Management.
- The Analysis of the Draft EIS prepared by the Mayor and City Attorney of Los Angeles, February 1975, and submitted on behalf of the Southern California Council of Local Governments.

It is our opinion that the Draft EIS generally treats the potential air quality impact of Outer Continental Shelf (O.C.S.) development on Southern California in a superficial manner that is incomplete, frequently misleading, and in some aspects contradictory. Thus, for example, the EIS does not incorporate the latest scientific information on emissions, transport, and chemical and physical transformations of air pollutants, as well as trends in air quality in the South Coast Air Basin (SCAB). Additionally the potential impact on the ambient levels of such known toxic pollutants as ozone, nitrogen dioxide, the peroxyacyl nitrates, carcinogenic polycyclic aromatic hydrocarbons, etc., and others suspected of being harmful to man such as sulfate and nitrate aerosols, is given inadequate or no consideration. Similarly, insufficient attention is paid to the potential air pollution impact of the proposed development on agricultural crops and on possible further degradation of visibility in the SCAB.

Finally, the EIS does not attempt to quantify insofar as possible the potential air pollution impact using the best available data (or estimates when actual experimental data are lacking) and current state-of-the-art airshed models for photochemical air pollution.

However, since the Draft EIS did not appear to be dated, we were unable to ascertain whether or not some of these omissions resulted from the lack of availability of such information when the EIS was being prepared.

It is generally agreed among air pollution experts that the potential impacts of such a complex problem might best be treated by a detailed analysis of each of the relevant scientific, medical, and socioeconomic elements of an overall air pollution system as shown in Figure 1.



It appears that this EIS discusses in an uneven fashion only selected aspects of such a system while neglecting others.

General conclusions similar to ours are stated in the critique of the Draft EIS prepared by the air pollution experts of the Scientific Advisory Panel and in the actual "Analysis of the Draft EIS." We concur with and strongly support their views. Evidence upon which we base our conclusions and our support for the position on air pollution impact taken in the Analysis of the Draft EIS is outlined in some detail in the main body of this report and the main points summarized below.

- The pollutant emission inventories presented in the report are based on 1972 data without comment as to their accuracy when, in fact, the uncertainties are often large. Thus we feel it inadvisable to locate any major pollutant source upwind of the centers of population without first quantifying the anticipated increase in total emissions of each pollutant due to the new source. Furthermore, for some pollutants (e.g., SO_x and NO_x) the relative contributions of stationary and mobile sources in SCAB are predicted to change significantly between 1972 and 1980 in part because of the increasing impact of the energy crisis and associated increased use of high sulfur fuels. Hence the EIS should compare the anticipated increase in the emissions of each pollutant associated with O.C.S. development with the inventories for 1975, 1980, 1985, 1990, etc.

- The transport and dispersion of pollutants from the lease areas to the coastal and inland regions of SCAB are not adequately discussed. Thus while at least three maps presented in the Draft EIS show the direction of the prevailing winds during the day to be onshore during the summer peak oxidant months, it is repetitively stated in the EIS that the sale

areas, which are located in some cases only 3 miles from the shore, are too far from the coast to contribute significantly to the pollutant concentrations inland. Actually the wind direction maps in combination with recent studies showing the transport of pollutants from Long Beach over large distances (60 miles or more) appear to contradict these statements. Thus in our opinion, the combination of hydrocarbon emissions released several miles offshore and transported to the mainland with the large quantities of NO_x emitted in that region by fossil fuel power plants, refineries, motor vehicles, etc., may lead to an increase in oxidant at the coast and well inland. Experimental and theoretical modeling studies are required to assist in clarifying this point.

We fully recognize there are some serious limitations in the availability and accuracy of certain relevant air pollution data and in one's ability to predict absolute changes in ambient pollutant levels (especially of secondary pollutants such as ozone) using mathematical models. Nevertheless, such models are presently widely used by government agencies, private industry, and research organizations to predict the relative change in pollutant levels associated with a major development. Of necessity they form an integral part of any EIS for a proposed activity such as airport expansion, construction of a new fossil fuel power plant or refinery, and indeed, even major shopping centers. In short, state-of-the-art modeling studies of the air quality impact of the O.C.S. development constitute a crucial aspect of the Draft EIS and should be provided.

- Little or no attention is paid to the possible economic impact on agriculture, a major industry in SCAB, associated with the increased levels of such severe phytotoxicants as ethylene, ozone, PAN, etc. For

example, extensive crop damage has occurred recently in Orange County when in November, 1973, during one air pollution episode, large amounts of marketable crops were severely damaged by smog with concomitant substantial economic losses.

In summary then, the introduction of an additional, possibly significant source of pollutants at sites which are adjacent to a heavily populated area where the air quality standards for photochemical oxidant are already exceeded more than 200 days per year, must be approached with a great deal of cautious, thorough, and insofar as possible, quantitative reasoning. These criteria do not appear to have been met in the Draft EIS.

GENERAL ASPECTS OF AN EIS: THE OVERALL AIR POLLUTION SYSTEM

In dealing with the potential impact of major projects such as offshore drilling which will involve many complex interactions with the environment, it is useful to examine the possible consequences of the operation in terms of an overall system (Fig. 1). This logically relates the scientific, technical, medical, social, economic, and political elements of the problem and incorporates appropriate and highly significant feedback loops.

The diagram shows schematically that the primary pollutants, such as nitric oxide and hydrocarbons, which are emitted and subsequently transported via meteorological and topographical phenomena undergo chemical and physical transformations in the atmosphere leading to the formation of secondary pollutants (e.g., nitric oxide gas $\rightarrow$ nitrate particles), many of which are known to have effects on human health, agricultural crops, visibility, and materials. If the relationship between the ambient concentrations of a given pollutant and its effects on human health is known, a primary air quality standard (A.Q.S.) can be set for that pollutant. Emission control programs

are then established to reduce ambient levels of that pollutant to such a degree that the A.Q.S. is not exceeded more than once per year. The loop is completed through the legislative, societal, and technical elements of the system.

Prior to considering the Draft EIS in detail, let us first consider in more depth that portion of the air pollution system dealing with the emission, transport, and chemical and physical transformations of the pollutants and their impact on receptors.

● Emissions

In order to describe adequately the pollutant emission inventory for a region, one must know accurately which pollutants are emitted, the magnitude of the emissions, the source locations, the temporal variation in the emission rates, and the process responsible for the generation of the pollutants (the latter for defining possible control measures and their effectiveness).

The magnitude of the emissions is often particularly difficult to define. Thus while the emissions of SO_x from the combustion of fossil fuels can be estimated with reasonable accuracy from the sulfur content of the fuel, the emissions of many other pollutants depend on such a variety of complex factors that accurate calculation of the ultimate emissions are impossible. The formation of nitric oxide (NO) from N_2 and O_2 , for example, during fossil fuel combustion depends in a complex manner on the combustion temperature, the amount of O_2 present, and the residence time in the combustor. Similarly, hydrocarbon emission rates from combustion or refining processes are not readily calculated.

The emission of such pollutants, then, must be carefully monitored in order to arrive at an accurate emission inventory. This has been carried

out for NO_x in the South Coast Air Basin, for example, by KVB Engineering as reported to the California Air Resources Board in September, 1974. Comparable studies have not yet been completed and released officially for hydrocarbons and SO_x and the uncertainties in their emission inventories are large.

Source Location and Transport Phenomenon

It is important to recognize that pollutants emitted at the western end of the South Coast Air Basin, under typical summer and early fall daytime meteorological conditions, are carried far inland by the prevailing winds. Hence a pollutant source located near the coast has the potential for impacting a much greater fraction of the population in SCAB than one located in the eastern portion of the air basin.

Thus source location and the transport of pollutants are extremely important parameters. In this regard two recent ARB-supported studies, one by Metronics, Inc., the other by Meteorology Research, Inc., have documented this inland transport of pollutants in the South Coast Air Basin using fluorescent tracers and ozone measurements respectively. Thus Figure 2 shows that pollutants from a fossil fuel power plant in Long Beach can be transported inland over distances of 60 miles or more within a single day.

Chemical and Physical Reactions in the Atmosphere (Transformation)

As mentioned above, the reactions of the primary pollutants to form secondary pollutants are extremely important in that the effects of the secondary pollutants on health, visibility, and plants may far exceed those of their precursors. For example, simple hydrocarbons at levels commonly encountered in urban air have no known health effects on man. However,

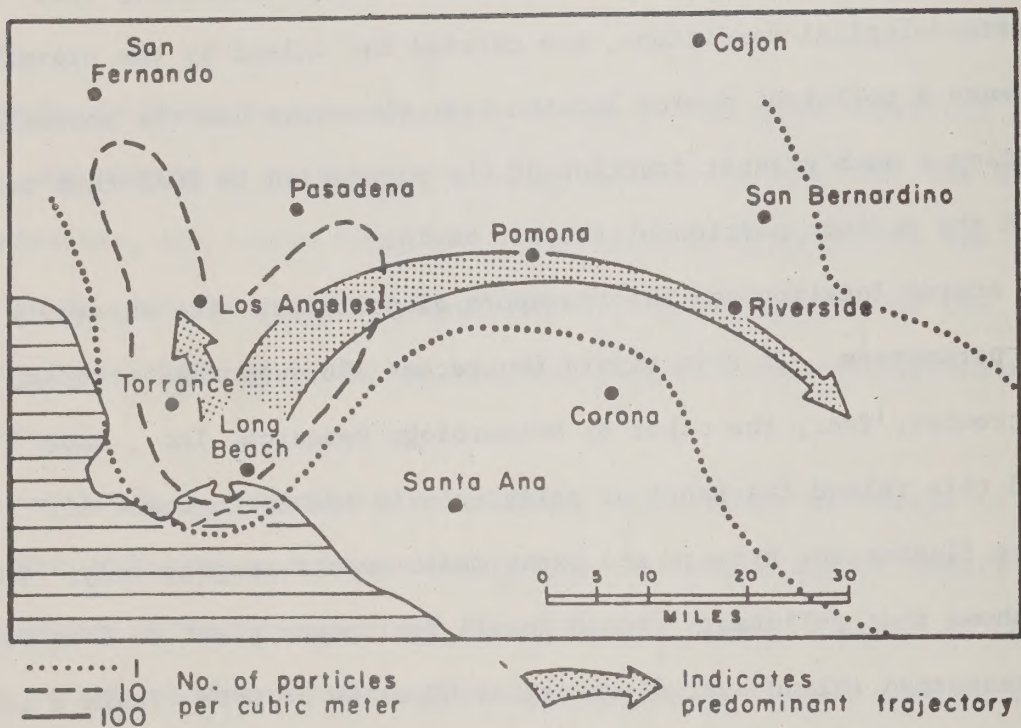


Figure 2. Tracer test summary, August 3-4, 1973, Long Beach source--elevated to simulate industrial pollutants. Contours represent an effective average concentration of tracer material from a normalized source of 5×10^{14} particles, released 0900-1500 hours, PST, on August 3 from a power plant stack.³ (Metronics Associates, Inc., Technical Report No. 197, July 1974.)

they react with NO_x in the presence of sunlight to form ozone, as well as other toxic chemicals such as PAN and NO_2 .

In addition, secondary particulate formation in the atmosphere is of prime importance in SCAB. Thus the atmospheric oxidation of gaseous SO_2 and NO_x produces sulfate and nitrate aerosols which significantly degrade the visibility and may well be toxic. Similarly, organic aerosols are formed by a variety of reactions, including that of ozone with olefinic hydrocarbons. This reaction also produces an intermediate which enhances the oxidation of gaseous SO_2 to particulate sulfate.

Impact on Receptors

Finally, the pollutants' (primary or secondary) impact on a receptor—human, plant, or material. The primary gaseous pollutant SO_2 , for example, in sufficient concentrations adversely affects the human respiratory system and is a serious phytotoxicant. Particulate polycyclic aromatic hydrocarbons such as benzo-(a)-pyrene also have well documented carcinogenic effects; however, to date no air quality standards exist for these species even though they are formed as a result of incomplete combustion of fossil fuels and are widely dispersed. The simplest olefinic hydrocarbon, ethylene, does not affect human health at ambient concentrations but does attack field crops and flowering plants such as orchids.

Secondary pollutants such as ozone, peroxyacetylnitrate and NO_2 attack man's respiratory system and adversely affect plants such as lettuce, citrus trees, ponderosa pine, etc. Rubber, of course, degrades in the presence of ozone due to cross linking or scission of the polymer chains. Additionally, acid particulates corrode materials such as metals.

- Mathematical Modeling

As stated earlier, emission, transport, and transformation processes can be combined in a mathematical model to predict pollutant concentrations at a receptor. Currently the results from such mathematical models contain many uncertainties, particularly when used to predict secondary pollutant concentrations. However, they do serve to give a "best estimate" of the relative increase in ambient levels associated with a given increase in emissions.

SPECIFIC COMMENTS ON AIR QUALITY ASPECTS OF THE DRAFT ENVIRONMENTAL STATEMENT

Some specific air quality aspects of the Draft EIS are now considered in more depth in the context of the preceeding discussion.

Volume 1

- The report includes estimates (Vol. 1, pp. 17,18) that

"refinery capacity in California will have to be increased by approximately 30 to 55 percent by 1985. ---If this sale takes place, production is expected to flow to existing facilities in the Los Angeles/Long Beach area. It may be considered feasible to establish a new major production refinery in Ventura County---."

The possible impacts on air quality of this proposed increase in refinery capacity is not treated adequately in Volume 2. For example, it is not obvious to us that sufficient accurate data exist at the present time to support the statement (Vol. 2, p. 189) that

"other refineries and related uses in the Los Angeles area do not violate the air quality standards established by state and local governments."

This being the case, it is difficult to see how the conclusion is reached that increasing refinery capacity would result in "lowering the amounts of emissions" (Vol. 2, p. 189).

Such crucial statements should be supported with data on the current emissions of each pollutant from existing refineries and the corresponding capacity/production data, proposed control measures to be implemented on new and existing facilities and data showing the reduction to be achieved for each pollutant by these controls, and finally, the anticipated total emissions per day of each pollutant when the refineries operate at full capacity. This information is essential in the EIS because of the source location, the reactions of hydrocarbons in ambient air, and the well-documented meteorology of the area.

In addition, the possible construction of a refinery in Ventura County should be examined in detail since hydrocarbon emissions from a major refinery may be sufficient to cause an unacceptable increase in oxidant levels when they interact with the NO_x emissions from the major fossil fuel plant and motor vehicles in that area. In-depth modeling studies using best-available, or where necessary, experimentally determined accurate input data are essential prior to construction or expansion of such refinery facilities.

In Volume 1 (pp. 682-706) a discussion of the past and present air quality of the two air basins located within the study area is given. The following comments pertain to that section:

- In discussing hydrocarbons and their effects (p. 686), no mention is made of the effect of ethylene on plants.

- No mention is made of the distinction between the two classes "reactive" and "nonreactive" hydrocarbons. This is important because it is not total hydrocarbon emissions which are of interest in photochemical smog formation, but rather the reactive hydrocarbon portion. We recommend that only methane be considered nonreactive since all other hydrocarbons react to some extent over a 6-8 hour period of downwind transport.

- Finally, no mention is made of the importance of oxygenated hydrocarbons. Formaldehyde and other carbonyl compounds, for example, help to initiate and accelerate formation of photochemical air pollution.

- The term "photochemical oxidants" (p. 687) should be more specifically defined as consisting primarily of ozone, but also of smaller amounts of PAN, NO₂, etc. In addition, it should be pointed out that "oxidants" are formed by the reactions of all hydrocarbons in the presence of NO_x and sunlight, with methane, however, reacting sufficiently slowly to be considered "nonreactive."

- In light of the recent controversy over oxidant measuring techniques, the method of measurement of these pollutants used to derive the concentrations in Table II-115 (p. 688) should be stated.

- The statement is made on page 689 that "[Primary] particulate matter did not constitute a major problem for the [South Coast] air basin," [authors inserts]. This is rather misleading since secondary particulate matter formed by chemical reactions in the atmosphere is of major concern in the area as discussed in the recent report for the ARB, "Characterization of Aerosols in California (ACHEX). In addition, no discussion of the importance of the size and composition of the particulate for the resulting impact on human health or visibility is given.

- In Table II-116, no estimate is given of the accuracy of the emission inventory, which as discussed above, is poor in many cases. The use of three significant figures in the data also incorrectly implies an accuracy which doesn't exist. Furthermore, the term "organic gases" should be clarified; does it refer to the emission of "reactive" or total hydrocarbons? If the former, what definition of "reactive" is used?

- The average wind speeds at ground level are reported on page 691 without regard to the variation of wind speed with height which can play an important role in pollutant transport, as shown by the Metronics and M.R.I. studies.

- Table II-117 is also presented without regard for accuracy of the emissions inventory. In addition, it is misleading to present the data for 1972 when the impact of the offshore drilling will not be felt until the 1980s (Vol. 1, pp. 16,17). By this time it is generally agreed that stationary sources will have become significantly more important relative to mobile sources than in 1972.

For example, according to the KVB report, by 1980 NO_x emissions from stationary sources will account for approximately 50% of the total NO_x emitted in the South Coast Air Basin. Hence one must show not only the current emissions data but also those predicted for 1980, 1985, 1990, etc., with and without the proposed development, in order to more accurately depict the relative contribution of the proposed project.

- The trends in pollutant concentrations shown in Tables II-119, II-121, and II-122 are not very meaningful in that the location of the monitoring stations at which the data were recorded are not given. Thus,

for example, while ozone concentrations have, in fact, decreased in downtown Los Angeles, in the eastern portion of the basin they have been increasing since 1972. Figure 3, for example, shows the trend in oxidant concentrations in San Bernardino which experienced its worst year in history in 1974. The minimum in 1972 appears to reflect favorable meteorological conditions rather than a true decrease in oxidant formation.

Volume 2

In Volume 2 of the Draft EIS the possible impacts of the proposed offshore drilling are discussed. The following comments pertain to that presentation:

- The statement is made on page 183 that

"The quality of air over the sale area could be degraded from several types of sources, including exhaust emissions from stationary power units, source vehicles, and by the accidental release and combustion of oil or gas. Because of the distance of the lease areas from shore, the impact of exhaust emissions will be small and unimportant."

Such a conclusion is hardly consistent with the known transport of pollutants over large distances and the proximity to shore of several lease areas where major reserves are predicted. Thus Figure I-1 (Vol. 1, p. 2) shows that the San Pedro Bay and Santa Monica Bay tracts lie very close and sometimes touch the 3-mile line. These areas contain a large fraction of the total recoverable reserves in the 5 sale areas shown in Figure I-1 (Vol. 1, p. 1). Furthermore, as shown in Figure II-23 (Vol. 1, p. 57), Figure II-24 (Vol. 1, p. 59), and the diagram on page 704, the prevailing daytime winds in the summer are inland. Hence the above quote

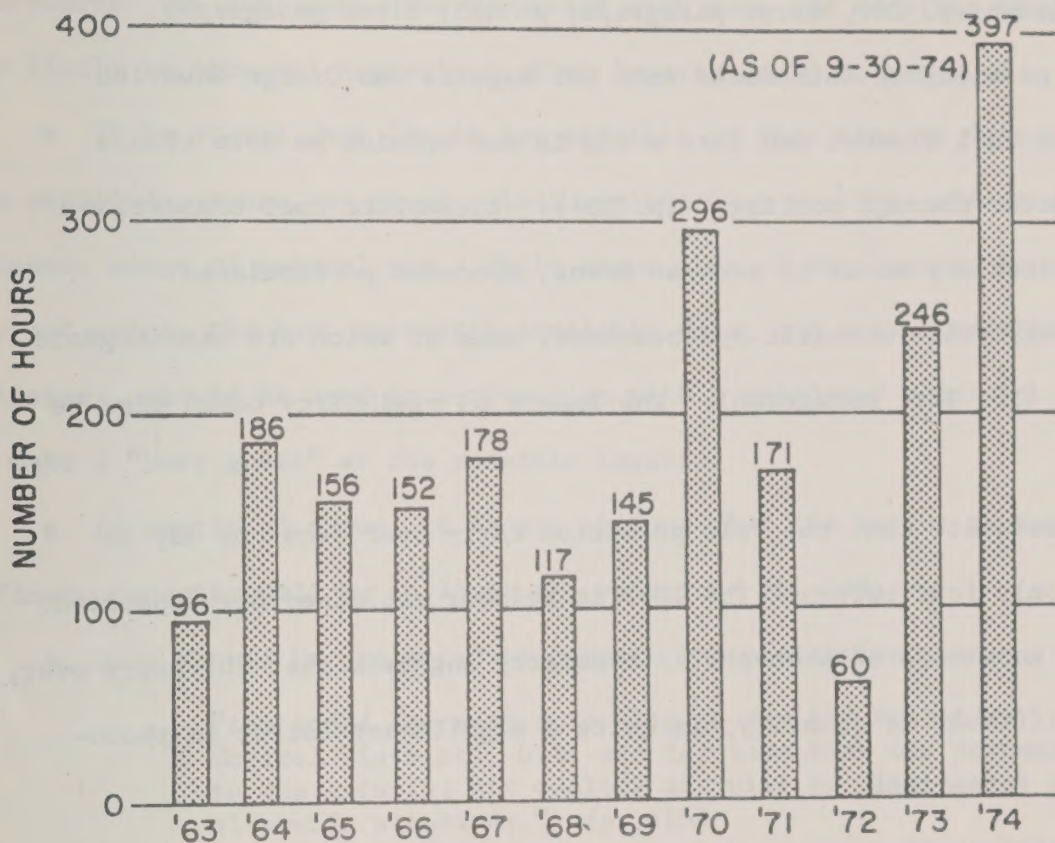


Figure 3. Number of hours per year for which the hourly average oxidant concentration equaled or exceeded 0.20 ppm at San Bernardino air monitoring station. (Data from San Bernardino County Air Pollution Control District.)

does not appear to be supported by facts. This omission of a detailed consideration of the important transport phenomena occurs repeatedly throughout this discussion (e.g., p. 183, last paragraph; p. 185, second and last paragraphs; p. 186, first, second, and last paragraphs; p. 189, second paragraph; p. 267, first paragraph; p. 415, first paragraph).

- The particulate introduced into Los Angeles and Orange Counties due to an oil well blowout and fire would in our opinion be more than a "nuisance factor through soiling," (p. 184). Incomplete fuel combustion, which must certainly occur in such an event, produces particulates containing polycyclic aromatic hydrocarbons, many of which are carcinogenic. (See also p. 415, last paragraph). The impact on visibility could also be significant.

- The estimate that the "air pollution carry over from one day to the next is only four percent" (p. 184) is neither explained nor supported. In fact, our knowledge of atmospheric chemistry suggests that the carry over, admittedly difficult to quantify, is quite a significant factor in photochemical smog formation.

- The minimization of the impact on the offshore islands due to the "moisture content of the air" (p. 184) requires explanation and support (see also p. 189, second paragraph, and p. 415, first paragraph). In some cases, the presence of moisture promotes the formation of toxic compounds (e.g., nitrous acid).

- Some corrections in the text are needed on p. 184. For example, what is a "volatilized particulate"? Does the EIS really mean "nitrous oxide" and "sulfur monoxide" would be produced?

- What dust and fumes are expected during installation of onshore pipelines and facilities? Over what period of time would these occur?

- The statement with respect to onshore operations relating to natural gas that "no adverse impact will occur during normal operation procedures" (p. 188) should be supported with data and modeling studies. How likely is abnormal operation? What impacts would it produce?

- It is stated that "it is not possible at this time to determine the magnitude, range, or geographical regions that would be affected" from consumer usage of natural gas. While input data of the desired accuracy may not exist, the best currently available data, and estimates where necessary, should be used in conjunction with a validated model in order to make a "best guess" at the possible impacts.

- As mentioned above, it is not obvious that the impact of increased refinery capacity will be to lower the emissions (p. 189).

- Data should be presented to support the contention that

"the added increase according to the Air Pollution Control Districts, will add far less than one percent to the existing air quality and will be within the allowable standards." (p. 415)

- Data on the pollutants emitted and the quantities during a fire after a gas well blowout should be presented to support the dubious statement that "mainly--carbon dioxide and water vapor" are emitted (p. 415).

CRITIQUE ON
SITE SPECIFIC DEIS

FOR

1975 OCS OIL AND GAS
GENERAL LEASE SALE OFFSHORE
SOUTHERN CALIFORNIA

BASELINE CHEMICAL PROPERTIES AND
OPERATIONAL EFFECTS ON
QUALITY OF ENVIRONMENT

BY

I.R. KAPLAN
PROFESSOR OF GEOLOGY AND GEOCHEMISTRY
UNIVERSITY OF CALIFORNIA

Introduction

This DEIS is a significant improvement over the DES 74-90 issued last year for the increase of acreage for oil and gas leasing on the OCS. Unlike the previous report, this report specifically deals with local problems and attempts to direct the discussion to local problems. It expands much of the discussion previously made and attempts to frame the consequences of exploration and drilling in terms of its effect on the Southern California coastal environment.

The document is divided into four volumes. Volume I deals with baseline knowledge relating to the physical, chemical, biological and historical background of the environment. Volume II deals with the effect of drilling, production, transport and accidents on the environment. Volume III lists a set of Appendices dealing with policy, legislation and environmental documentation. Volume IV is composed of a set of charts issued by the U.S. Geological Survey.

As these comments are largely aimed at evaluating the validity of the document regarding the chemical environmental factors, I will address myself to this confined area only.

First, it is necessary to state that the DEIS did not have any apparent falsifying statements. From its nature, it appears to have been compiled from information supplied by several sources. In some cases, this information was used without any apparent review, whereas in others, an attempt was made to define processes in terms of the specific environment. Nowhere in the

DEIS is an attempt made to suggest that an accident or pollution could not result, even though reasonable efforts are made to prevent this from happening. In fact, in the very first page (i) of Volume I under item 3, the paragraph begins:

" All tracts offered pose some degree of pollution risk to the environment..."

Baseline Information

The sections itemizing the nature of the chemical environment are largely described in Volume I pages 46-52, 86-97, 315-324, 682-717.

The discussion of natural seeps on pages 46-52 gives little useful information on variation of flow rates or chemical character of the seeps. A map would have been very useful in locating the occurrence of the seeps in relation to land seeps, fracture zones and present lease locations.

The discussion on pages 86-97 on Chemical Oceanography does not do justice to the state of knowledge of the chemical parameters. Each of the parameters such as nutrients, salinity, oxygen and trace metals receive one or two-page attention. For example, Fig. II-46 on page 89 shows a salinity versus depth curve, but does not give exact location or time of year. It is therefore out of context and meaningless. On page 92, a statement is made that oxygen concentrations in spring and summer are higher in surface waters than fall or winter. This is not explained and on face value might be incorrect, because surface waters in winter are (a) less saline and (b) colder. However, in spring and summer the level of saturation is probably

greater. On page 93 in paragraph 2, a statement is made that the "oxygen minimum layer is consistently found below the salinity-minimum layer whenever it is present". This does not mean much as water masses are defined by densities and not just salinity.

In a discussion of marine pollution caused by outfall from sewage or drainage, some misleading statements appear. For example, on page 712, in paragraph 3, I quote, "Sediment core samples taken in Santa Barbara Basin (SCCWRP, 1973) indicated that metals and chlorinated hydrocarbon concentrations have been relatively constant over the last 100 or more years". This statement in fact contradicts the published data given in the Three Year Report (SCCWRP, 1973). A quote on page 180 of the above reference reads as follows:

" Figure 6-21 shows the profile of mercury concentrations from the dated sediment layers in the Santa Barbara Basin. In addition to the regular box core samples, samples were obtained using a 'bootstrap' corer, which provided samples dating back 1,400 and 1,500 years. The concentrations of mercury have tended to increase fairly steadily in the last 150 years; sediment mercury concentrations are now approximately twice as great as they were in the 1820's. This observation is consistent with that of Weiss et al. (1971), who found approximate doubling of mercury concentration in dated glacial layers laid down in the Arctic in the last few decades. These authors have attributed this effect to an increased degassing of mercury from the earth's surface, possibly brought about by man's activities. Although the higher concentrations of lead in the recent sediments appear to be due to increased use of leaded gasoline in southern California, the source of mercury that has caused the recent concentration increases may be much more global in nature."

There is no discussion of chlorinated hydrocarbons from Santa Barbara Basin in this report, but two figures (Fig. 6-24, off Whites Point Outfall and Fig. 6-29, in Santa Monica Bay),

clearly show a marked concentration increase of about two orders of magnitude in surface (hence, recent) sediment.

Environmental Impact of Drilling and Production

In general, sections dealing with operational impacts give an accurate account of the state of knowledge. In Volume II, an attempt is made to use information available from analyses of formation waters, drilling mud and spills in other OCS areas as well as in the 1969 Santa Barbara spill. A statistical analysis of risks is made on previous experience to estimate risks of large or small spills.

The information outlining chemical changes which may result from such accidents are mainly correct. However, there is little definitive information given. For example, general reference is made in several places of paraffinic and aromatic hydrocarbons, but little precise data is presented to enable the reader to judge for himself the changes which may occur during alteration of seeps. For example, on page 54, Fig. III-7 gives a chromatograph of an alkane fraction of a seep oil, with virtually no explanation. Statements are made in several places of the toxicity of binuclear aromatic compounds, but no data is given for the composition of petroleum presently being produced offshore southern California or onshore wells which may sample oil-bearing Tertiary formations which underly the OCS.

A reasonable description is given for blow-out prevention and accident controls and operation inspection. There was no

evidence for a policy to monitor the marine environment during exploration and production to determine if environmental pollution is occurring.

Comments and Recommendations

The DEIS fails to present a coherent picture of the chemical environment. In part, this is possibly due to the necessity to summarize an enormous amount of information. The net result is that much of the information is so brief that it serves no useful purpose. Experts in the field understand and know all the properties which the DEIS attempts to describe, whereas those not familiar with the chemical environment, probably could not rationally utilize the condensed information without going to the original sources. Unfortunately, Volume I does not appear to contain a Bibliography.

It is apparent that the most likely parameters to be affected during production will be the trace metals and organic components, especially the petroleum-derived hydrocarbons. The DEIS only gives a one-page discussion on trace metals in coastal waters, no description of the baseline trace metal concentration in sediments and no account of the prevailing organic carbon content or hydrocarbon content of the water column or the sediment. Admittedly, there is little information to present but some does exist as outlined in the book by Emery ("The Sea Off Southern California", 1960).

It is apparent that although much is known about the

southern California Bight, a great deal of information is still needed to interpret changes in the environment which may result from exploitation of petroleum in the OCS. In particular, we have little knowledge of the present distribution of hydrocarbons in different sediment types. Although some data have been reported for straight-chain hydrocarbons, almost no published data exist for the more toxic aromatic compounds. The lifetime of hydrocarbons in sediments versus the water column is unknown.

The question of environmental monitoring appears to be neglected. Where a spill is substantially large and near the surface, oil can be observed from vessels or aircraft, but where it is released continually from small leaks at depth it may not easily be detected visually and the source may not be identified. What will be the monitoring procedures? Who will be responsible for implementing them?

An important question which will certainly arise in disputes, is the identification of oils in the surface waters of the OCS. What criteria will be used to differentiate petroleum produced from OCS drilling, natural seeps and imported (or exported) petroleum dumped from tankers? It is apparent that such criteria have to be established early. In particular, crude oil exposed to the atmosphere begins to alter and is converted to tars, in this case, the straight-chained paraffins are first to change. As these are the components most frequently measured, it is obvious they may be the least useful for interpretive purposes.

III SEISMICITY

ANALYSIS OF THE "DRAFT ENVIRONMENTAL STATEMENT FOR THE PROPOSED 1975 OUTER CONTINENTAL SHELF OIL AND GAS GENERAL LEASE SALE OFFSHORE SOUTHERN CALIFORNIA, OCS SALE No. 35"

James H. Whitcomb⁺

May 14, 1975

⁺Seismological Laboratory, California Institute of Technology, Pasadena,
California 91125

SUMMARY

This analysis of the "Draft Environmental Statement for the Proposed 1975 Outer Continental Shelf Oil and Gas General Lease Sale Offshore Southern California, OCS Sale No. 35" is primarily limited to the potential for earthquake-caused oil spillage in the lease area. The description of the geological and tectonic environment is generally adequate with the exception of the omission of the Newport-Englewood fault on the tectonic map showing faulting in the offshore area; this fault is judged important to decisions affecting the San Pedro Bay lease area.

I am in general agreement with this document's estimate of frequency of future magnitude 6.0 or larger earthquakes in the offshore Southern California area, about one every 10 to 14 years or four to six in 60 years. A major omission in the document is the lack of reference or use of the lease area's only source of long-term seismicity, the Southern California earthquake catalog. From this catalog it can be seen that the Santa Rosa-Cortes South area appears to have significantly lower earthquake hazard than the northern lease areas. Statistically, a magnitude 5.0 or larger earthquake can be expected in the general offshore area every 3 to 5 years, or twenty events in 60 years.

No mention is made of earthquake hazard in the environmental impact section of the document, with the apparent conclusion that earthquakes pose no increased risk for oil spillage. In my opinion, this conclusion is overly optimistic. It appears to be based mainly on case histories of land-based earthquakes and their effects on land-based structures, and it assumes an optimistic estimation of the state of the art in identifying active faults. The present state of the

art in identifying active faults, especially under water, is a matter of considerable scientific debate.

For several reasons, pipelines are especially vulnerable to rupture from fault motion and alternatives should be used whenever possible.

An earthquake hazard that has not been considered in the document involves the effect of local earthquakes on the water environment surrounding drilling platforms and pipelines. Significant permanent horizontal or vertical displacement of the bottom on which rests a drilling platform or exposed pipeline can cause large sudden currents that can possibly do major damage to drilling platforms, pipelines, and vertical pipe and casing of producing wells. The potential occurrence of a major earthquake in a highly developed offshore oil field creates the possibility of an oil spillage from so many sources that existing or contemplated techniques and organizations could not cope with the repair and clean-up operations in time to prevent significant impact on the environment. Physical and engineering considerations in relation to this phenomenon deserve considerably more attention than they appear to have received.

This leasing and development project should be considered in relation to other oil-related activity in the area. An oil spill "budget" estimating amounts from all natural and man-caused sources should be made, and environmentally acceptable but reasonable limits should be imposed.

SCOPE OF THIS ANALYSIS

My analysis of the "Draft Environmental Statement for the Proposed 1975 Outer Continental Shelf Oil and Gas General Lease Sale Offshore Southern California, OCS Sale No. 35" (herein referred to as the DES) is primarily limited to the geological and geophysical aspects of the document, especially as regards the earthquake potential in the vicinity of the tracts for lease

and the associated environmental hazards from those earthquakes. The major environmental hazard from earthquakes in offshore oil production is oil spillage. Therefore, this analysis is directed towards factors that relate to the risk of spillage.

DESCRIPTION OF THE ENVIRONMENT

The description of the geology and tectonics of the Southern California offshore area is generally well done. In the section "Description of the Environment" in Volume I and in Appendix 10 of the same name in Volume III, the offshore area is described as a complex of islands and deep basins bounded and formed by faults that became active 11-20 million years ago. There is evidence of tectonic activity at least as recently as in the Quaternary period, which began 2 million years ago (DES, Volume I, page 445; hereafter written as DES, I, 445). Faults that show evidence of Quaternary or late-Quaternary motion are generally considered to be currently active. Thus, from the structure of the Southern California offshore area and the geologic record, there is every indication that at least some of the numerous and complex fault systems in this region are now active.

The DES does a relatively complete job of listing the major felt earthquakes in the borderland region in Appendix 13 (DES, III, 523). However, one of the most important earthquakes relevant to the lease areas, the 1933 Long Beach earthquake adjacent to the San Pedro Bay area, does not have its associated rupture, the Newport-Englewood fault (Richter, 1958, p. 497; and Jennings, 1973), included on the tectonic map showing the important faults of the area (DES, IV, 12). This fault, in addition to being important in considerations of hazard to the adjacent lease area, is an important factor for well-to-shore pipeline structures.

It is correctly concluded in the DES that the chances are small for destructive shaking offshore from any but a "great" earthquake (magnitude larger than 7.1, Richter, 1958, Figure 28-1) that is located inland. Smaller earthquakes that are located close to production facilities offshore can cause damage from both shaking and fault displacement. It is desirable therefore to attempt to estimate the potential for earthquakes offshore of Southern California. While there are obvious limitations to calculating this from the limited sample of past earthquakes, it is the only option open to us at this time. It is interesting to note that, as shown in Figure 1 (Richter, 1958, Figure 28-1), of the six "great" earthquakes since 1769 in the latitudes of the areas in question, four are onshore and two are offshore. The two offshore events could imply that the northern-most lease areas, Santa Rosa-Cortes North and Santa Monica Bay, face a significant earthquake hazard because earthquakes of this size affect a large area. Figure 11-17 in the DES (I, 34), which shows events of magnitude 6.0 or greater since 1912, also leads to the conclusion that Santa Rosa-Cortes North, Santa Monica Bay, and perhaps the San Pedro Bay areas are most hazardous. A magnitude 6.0 or greater earthquake can be statistically expected near these areas every 10 to 14 years depending on whether only offshore events are counted. This means four to six magnitude 6.0 or larger events in the immediate production areas could occur during the estimated 60-year life of the anticipated oil development. These numbers are similar to those obtained in the DES (III, 186).

One of the useful methods of estimating the hazard from larger earthquakes is by mapping the relative distribution of smaller shocks over a long period of time; for example, the U. S. Geological Survey has made this technique of mapping seismicity an important part of their earthquake research program. It is therefore puzzling that the DES does not use or even reference the Southern

Figure 1. Major earthquakes in the California region (from Richter, 1958,

Figure 28-1).

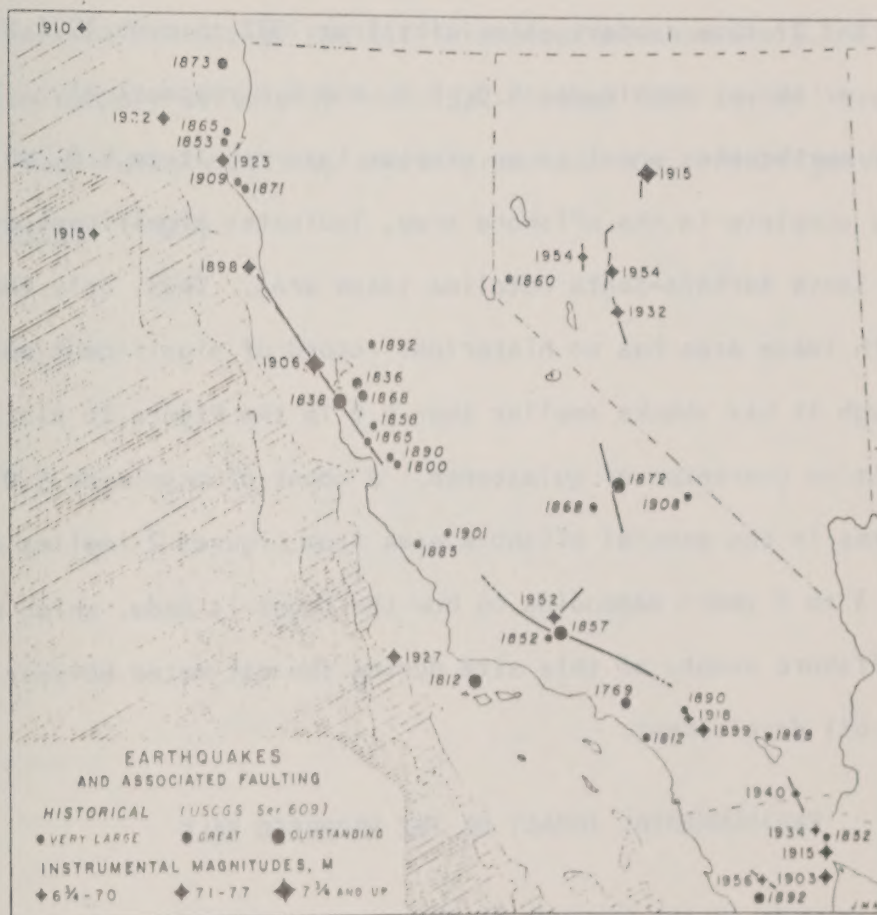


FIGURE 28-1 Larger earthquakes of the California region. Extent of faulting indicated.

California earthquake catalog, which is virtually the only source of long-term seismicity for Southern California (Hileman et al., 1973).

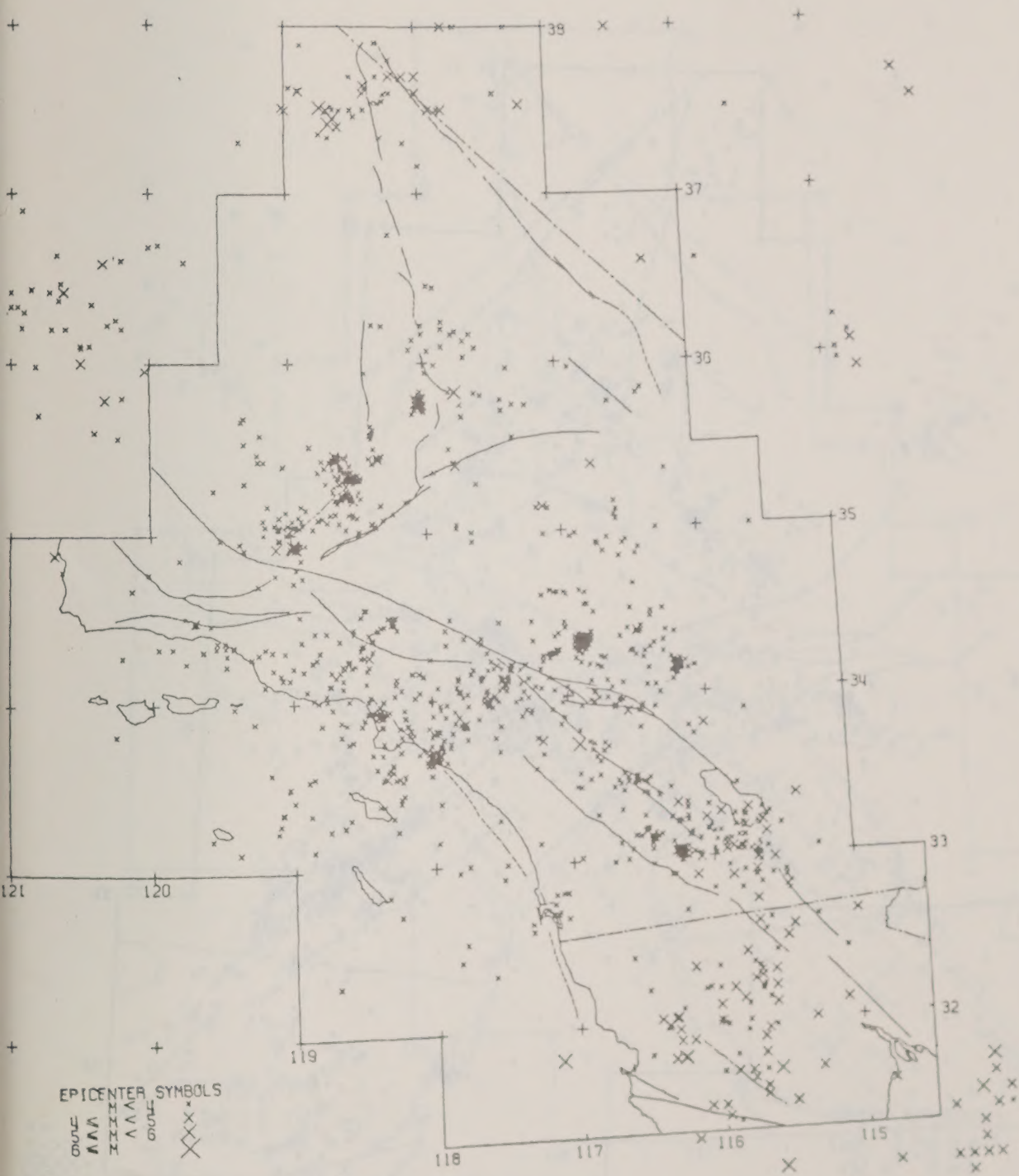
Figures 2a through 2i illustrate seismicity plots from Hileman et al. (1973) updated through 1974. Figures 2a through 2f include all events located during specific years in Southern California by the CIT Seismological Laboratory. Figures 2g, 2h, and 2i show summary seismicity from 1932 through 1972 for all events equal to, or above, magnitudes 4.0, 5.0, and 6.0 respectively. The summary plot for earthquakes equal to or greater than magnitude 4.0, which should be fairly complete in the offshore area, indicates significant activity in and near the Santa Barbara-Santa Catalina lease area. Thus, only the Santa Rosa-Cortes South lease area has no historical record of significant earthquake activity, although it has shocks smaller than 4.0 in the Figure 2c plot. Even this, however, is no guarantee of quiescence. A count of magnitude 5.0 or larger earthquakes in the general offshore area from Figures 2 implies an occurrence rate of one per 3 to 5 years depending on how the count is made, which would mean 12 to 20 offshore events of this size during the estimated 60-year life of the anticipated oil development.

ENVIRONMENTAL IMPACT OF THE PROPOSED SALE

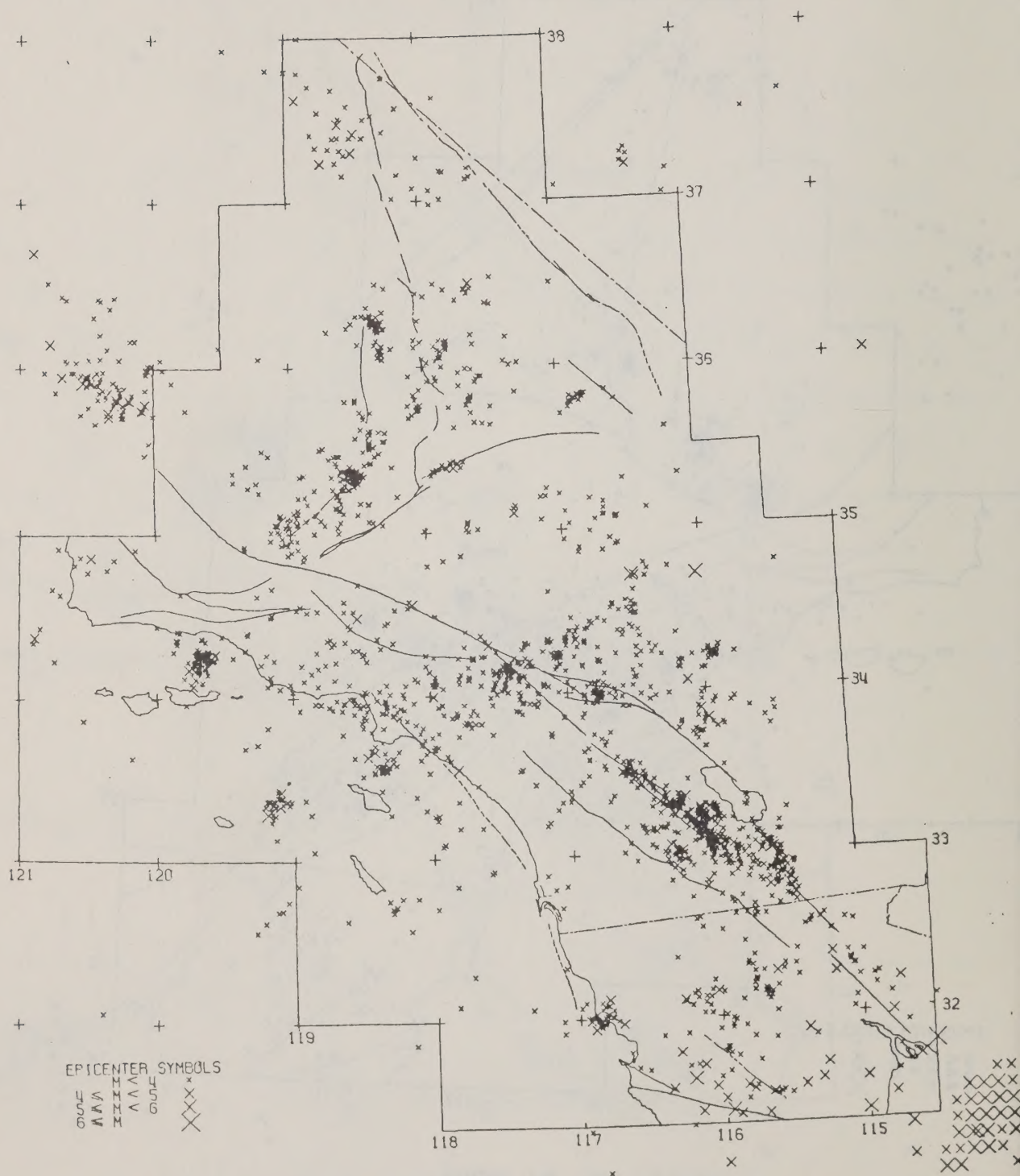
No mention is made of the hazards of earthquakes in the section "Environmental Impact of the Proposed Sale" (DES, II, 1). Apparently this implies that earthquakes and their potential effect on increased risk of oil spills can be ignored or avoided in offshore oil development. However, this is far from being clear and is, in my opinion, overly optimistic.

Much of the case in the DES for a low estimation of risk from earthquakes is based on 1) case histories of land-based earthquakes and their effect on land-based structures, especially the effects of the 1971 San Fernando earthquake; and

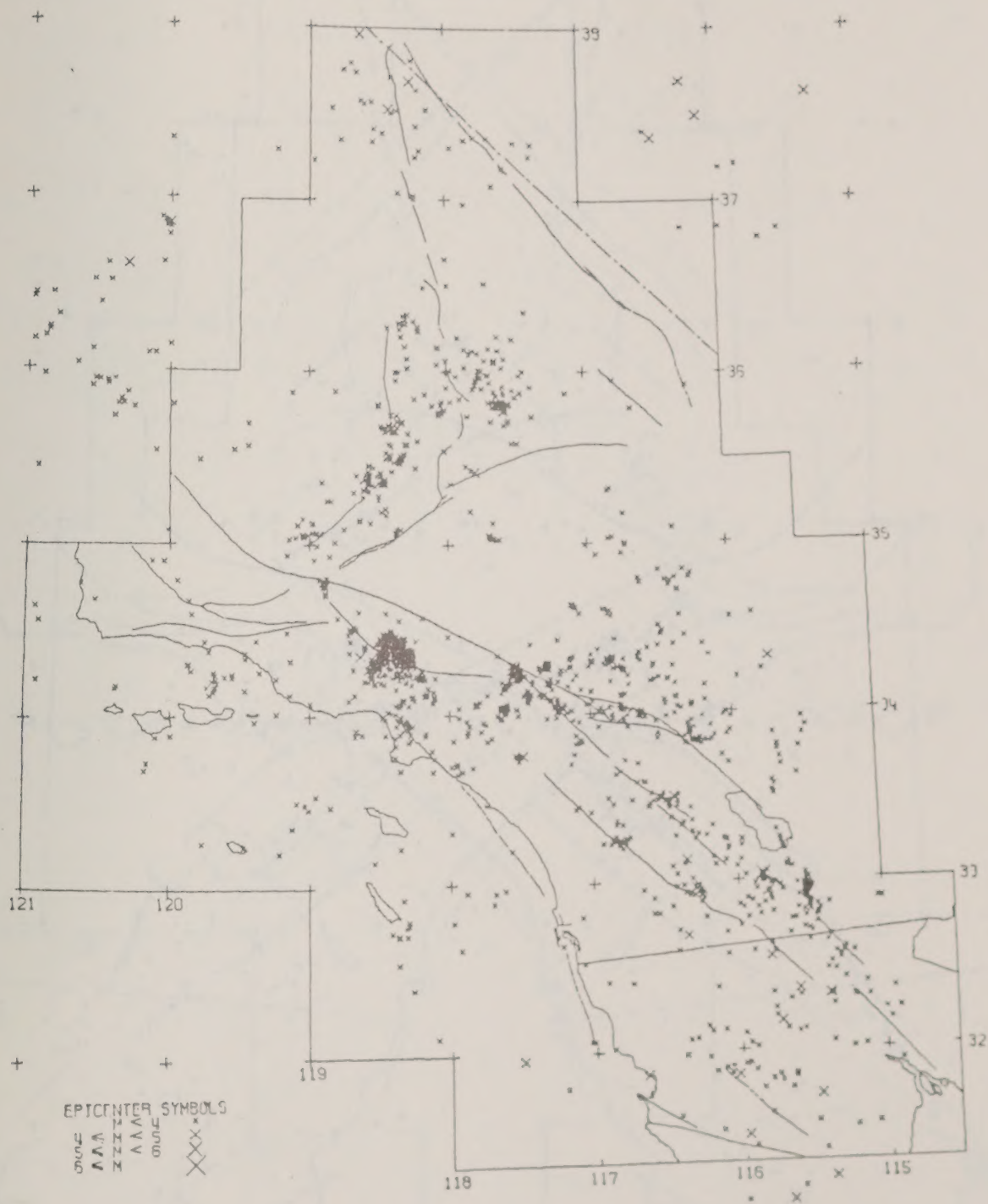
Figures 2. Figures 2a through 2f include all events located during specific years in Southern California by the CIT Seismological Laboratory. Figures 2g, 2h, and 2i show summary seismicity from 1932 through 1972 for all events equal to, or above, magnitudes 4.0, 5.0, and 6.0 respectively. All figures are taken from Hileman et al. (1973).



1960 THROUGH 1964. ALL EVENTS

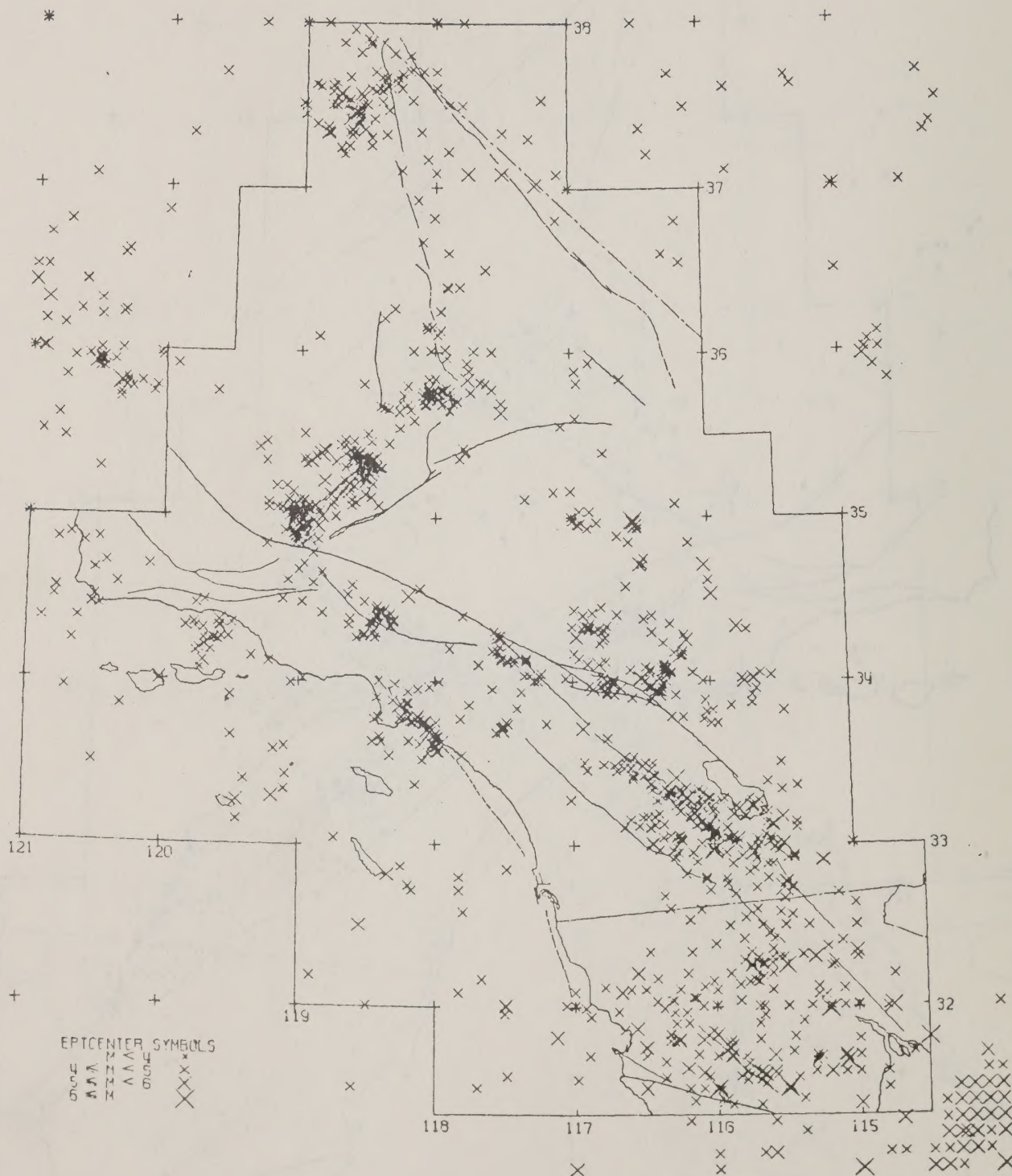


1965 THROUGH 1969. ALL EVENTS

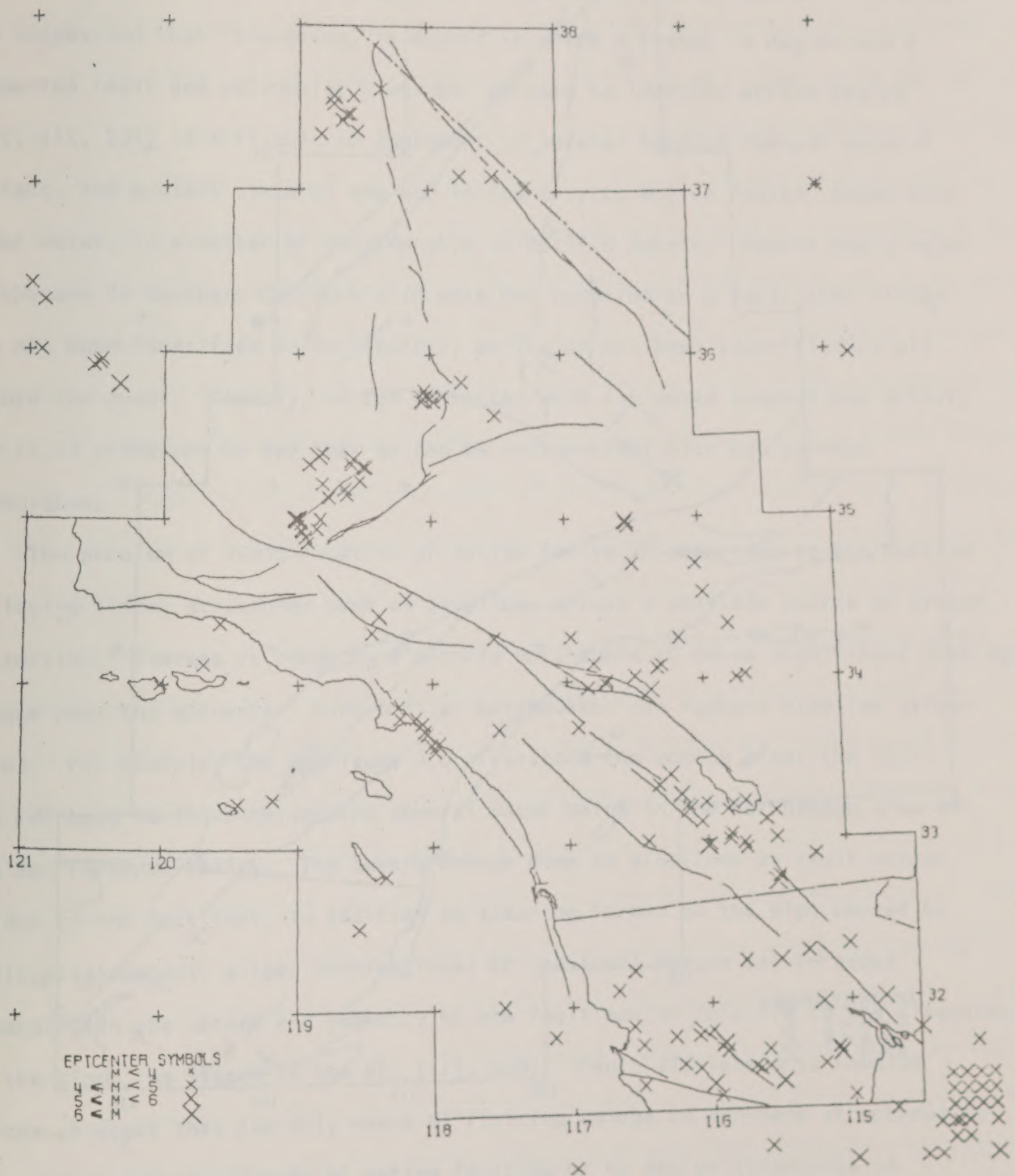


ALL EVENTS 1970 THROUGH 1972

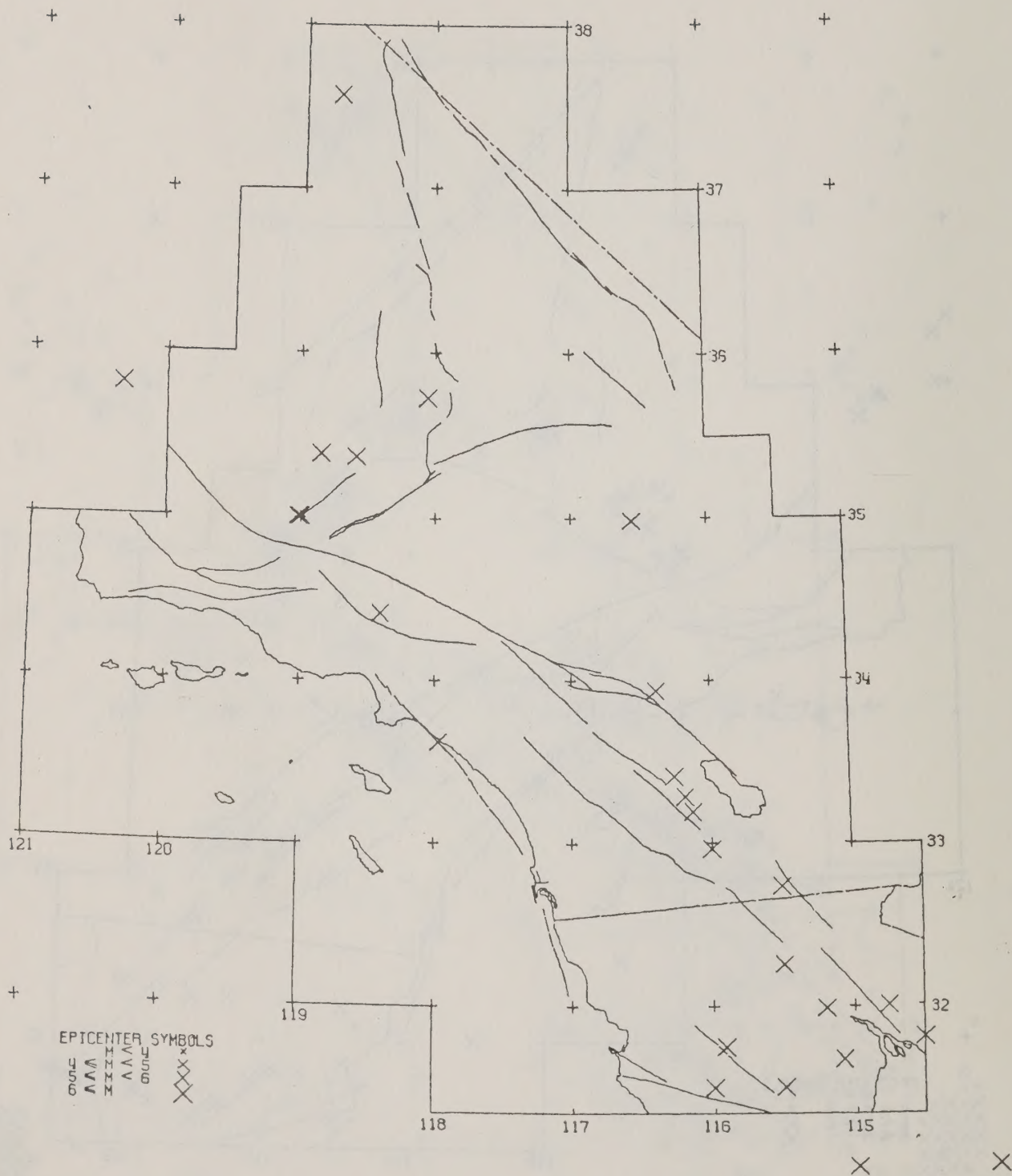




1932 THROUGH 1972, EVENTS EQUAL OR GREATER THAN MAGNITUDE-4



1932 THROUGH 1972, EVENTS EQUAL OR GREATER THAN MAGNITUDE-5



1932 THROUGH 1972. EVENTS EQUAL OR GREATER THAN MAGNITUDE-6

2) estimation of the state of the art in identifying active faults. Certainly the suggestion that "trenching," a method in which a trench is dug across a suspected fault and personally observed, be used to identify active faults (DES, III, 201) is difficult to implement in several hundred feet of water. In fact, the present state of the art in identifying active faults, especially under water, is a matter of considerable scientific debate. Nearly every major earthquake in Southern California to date has occurred on a fault that either has not been identified as particularly active or not been identified at all before the event. Clearly, we can do better with increased support and effort, but it is premature to say that we can be near-perfect with our current techniques.

The problem of identification of active faults is important to the hazards of laying linear structures such as pipelines across a possible source of ground distortion. Whereas it requires a sizable earthquake to cause significant shaking damage near the epicenter, much smaller earthquakes can rupture pipeline structures. For example, the magnitude 4.6 aftershock two months after the 1971 San Fernando earthquake ruptured several water mains in the Northridge area of the San Fernando valley. The severe damage done to pipelines by fault motion is due to the fact that, in addition to shearing forces on the pipe caused by fault displacement, either compressional or tensional forces can be added depending on the nature and geometry of the fault motion relative to the direction of the pipe. As stated in the DES (III, 200), "Fault displacements involve forces so great that the only means of limiting damage to man-made structures is to avoid areas along traces of active faulting or to design structures to accommodate the expected displacement." It is a valid question to ask if this can be done in an area of intense and complicated faulting as must exist offshore.

In the marine environment, the damage done by ruptured oil pipelines must be measured by more than the dollar value of the structural damage as is implied by the DES (III, 200). It must also be measured by the amount of oil spill generated by pipeline rupture.

Other problems complicate the use of pipelines. Pipeline leaks are sometimes hard to detect and according to the DES (II, 17), "During OCS operations, more oil has been spilled from pipeline accidents than from all other sources combined." In addition, burial beneath the ocean bottom increases the chances of pipe rupture from fault movement as compared to a pipe that is simply lying on the bottom so that more of the pipe can "give" with the bottom distortion. But this is in direct conflict with the regulation that pipelines in shallow water be buried so that ship anchors cannot hook and rupture them (DES, II, 17).

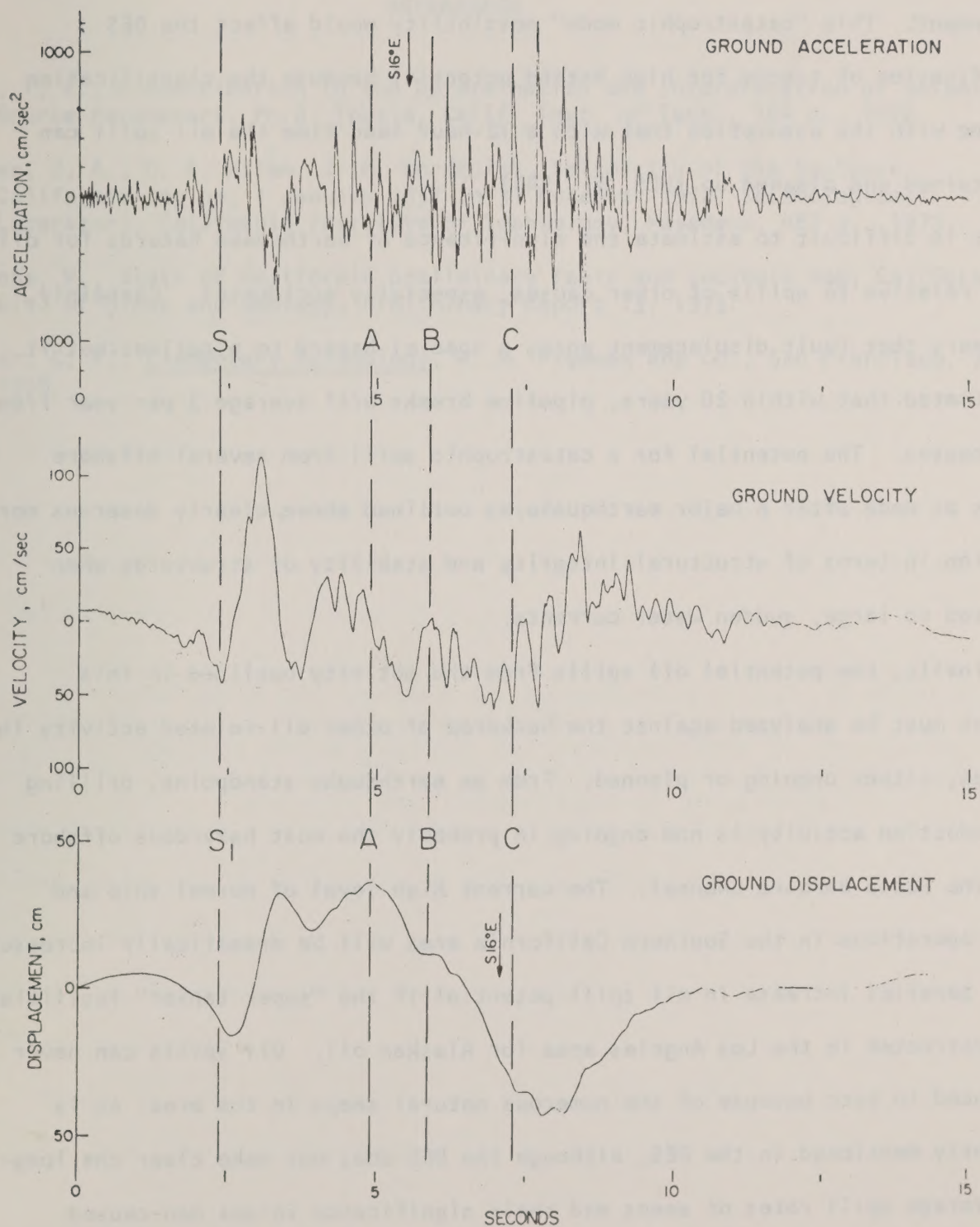
An earthquake hazard that has not been discussed in the DES is the effect of local earthquakes on the water environment surrounding drilling platforms and pipelines. Tsunamis, or water-surface gravity waves generated by earthquakes, have been mentioned but generally pose little hazard to structures standing in water over about 200 feet deep. However, if the structure happens to be standing on a part of the ocean bottom that experiences significant permanent displacement during an earthquake, two major effects can happen depending on the amount of the ocean bottom's horizontal or vertical displacement. In the case of significant horizontal displacement (strictly, the important direction is the component parallel to the ocean bottom), the drilling platform or pipeline structure will move laterally with the ocean bottom but the surrounding water will remain in place. The net effect is a sudden horizontal ocean current that is uniform from the ocean surface to the bottom. What is the approximate velocity and duration of this current for a typical large earthquake? This question is not easy to answer precisely, but estimates can be made from our

knowledge of the processes occurring during the 1971 San Fernando earthquake. Figure 3 shows, with an actual measured horizontal ground velocity at Pacoima Dam, that a peak velocity of 2 knots (100 cm/sec) occurred, with a velocity of more than 1 knot lasting for one second. Pacoima Dam was not in the area of maximum horizontal displacement, which was of the order of 3 feet. But if the same time history of displacement is assumed, a peak velocity of 6 knots is obtained. In the case of a production platform, this current would be acting over the whole submerged structure. While the response of drilling platforms and exposed pipelines to disruptive ocean currents of this type is beyond the scope of this review, it is entirely possible that major damage could be done to drilling platforms, pipelines, and the vertical pipe and casing of the producing well with the associated environmental hazards of oil spill, not to mention hazards to platform personnel.

The second major effect is associated with the permanent vertical displacement. It has been established by leveling surveys that a large part of the San Gabriel mountains was uplifted by 6 feet in the San Fernando earthquake. If this uplift were to occur instead under the shallow south underwater slope of Santa Rosa Island, an immediate southward flow of water would occur as the ocean seeks a level surface again. Calculation of the velocity of this flow, which would have the same characteristics and effects as the current discussed above, is dependent on the water depth and the areal extent of the uplift and again is beyond the scope of this review. However, it could be substantial and the tectonic history of the north channel islands is clearly that of tectonic uplift. Thus, offshore earthquakes of magnitude 6.0 and above can create special hazards that are unique to offshore structures resting on the ocean bottom.

The possibility of a major earthquake occurring in a developed offshore oil field creates the possibility of an oil spillage from so many sources that

Figure 3. Ground acceleration, velocity, and displacement measured at the Pacoima Dam during the 1971 San Fernando earthquake (from Hanks, 1972).



S16°E motion, Pacoima Dam—San Fernando, California, Earthquake
February 9, 1971, 6:00 P.S.T.

existing or contemplated techniques and organizations could not cope with the repair and clean-up operation in time to prevent significant impact on the environment'. This "catastrophic mode" possibility would affect the DES classification of tracts for high hazard potential because the classification was done with the assumption that with a 12-hour lead time the oil spill can be contained and cleaned up (DES, 11, 344).

It is difficult to estimate the significance of earthquake hazards for oil spills relative to spills of other causes, especially accidental. Certainly, it appears that fault displacement poses a special hazard to pipelines; but it is estimated that within 20 years, pipeline breaks will average 3 per year from other causes. The potential for a catastrophic spill from several offshore sources at once after a major earthquake, as outlined above, clearly deserves more attention in terms of structural integrity and stability of structures when subjected to large, sudden water currents.

Finally, the potential oil spills from the activity outlined in this document must be analyzed against the backdrop of other oil-related activity in the area, either ongoing or planned. From an earthquake standpoint, drilling and production activity is now ongoing in probably the most hazardous offshore area, the Santa Barbara Channel. The current high level of normal ship and tanker operations in the Southern California area will be dramatically increased with a parallel increase in oil spill potential if the "super tanker" facilities are constructed in the Los Angeles area for Alaskan oil. Oil spills can never be reduced to zero because of the numerous natural seeps in the area, as is frequently mentioned in the DES, although the DES does not make clear the long-term average spill rates of seeps and their significance versus man-caused sources. Clearly, an oil spill "budget" including estimates for all of these sources will have to be made, and environmentally acceptable but reasonable limits will have to be imposed.

REFERENCES

- Hanks, T. C., A Contribution to the Determination and Interpretation of Seismic Source Parameters, Ph.D. Thesis, Calif. Inst. of Tech., 184 p., 1972.
- Hileman, J. A., C. R. Allen, J. M. Nordquist, Seismicity of the Southern California region, 1 January 1932 to 31 December 1972, Seismological Laboratory, California Institute of Technology, Pasadena, 487 p., 1973.
- Jennings, W., State of California preliminary fault and geologic map, California Div. of Mines and Geology, Preliminary Report 13, 1973.
- Richter, C. F., Elementary Seismology, W. H. Freeman and Co., San Francisco, 768 p., 1958.

IV MARINE BIOLOGY

ANALYSIS OF ZOOLOGICAL PORTIONS
(Invertebrates and Vertebrates)
of Draft Environmental Statement
(DES) No. 75-8 for OCS Sale No. 35

by

Malcolm S. Gordon, Professor of Biology and Director,
Institute of Evolutionary and Environmental Biology
University of California, Los Angeles

Analysis of Zoological Portions (Invertebrates and Vertebrates) of Draft
Environmental Statement (DES) No. 75-8 for OCS Sale No. 35: "Proposed
1975 Outer Continental Shelf Oil and Gas General Lease Sale Offshore
Southern California"

by

Malcolm S. Gordon

Professor of Biology and Director, Institute of Evolutionary and Environ-
mental Biology, University of California, Los Angeles

This analysis of the subject DES is based upon careful readings of
the following sections of the DES:

Volume 1: II E, Biological Oceanography; II F, Important Marine
Associated Habitats; II G, subsections 3d (Sport Fisheries), 5f (Shellfish),
5h (Mariculture), and 5j (County by County Summary).

Volume 2: III B, Impact on the Living Component of the Environment:
an Introduction; III C, Impact on Biota of the Open Bight Region; III D,
Impact on the Biological Communities of the Coastal Zone; III E, Impact on
Commercial Fisheries; III I, subsections 5 (Sport Fishing and Recreation
Boating), 6 (Impact on Endangered or Threatened Wildlife), and 7 (Unique
Biological Environments); V A, Effect on Marine Organisms; V B, Wetlands and
Beaches; V E, Interference with Commercial Fishing Operations; VII C: Fish
and Wildlife Resources.

Volume 3: Appendices numbers 10E (Biological Oceanography), 10F (Im-
portant Marine Associated Habitats), and 18 (Effects of Oil on Marine Ecosystems).

General Comments

The DES is in many ways an impressive, informative and useful document.
However, the sections reviewed here fall substantially short of the goal of
constituting a satisfactorily complete and accurate Environmental Impact State-

ment. The shortfalls of greatest significance are of two kinds: 1) inadequate and/or incomplete discussions of important subject areas; and 2) omissions of any discussion at all of important subject areas. Less significant, but fairly numerous, are various errors of fact, or omissions of relevant details. Still less significant, but very numerous, are signs of haste in the preparation of the DES: typographical errors, grammatical or word usage errors, and inconsistencies in organizational patterns.

My overall conclusion is that the DES as now written is inadequate in a sufficient variety of sufficiently important ways that I would consider the Bureau of Land Management (BLM) to be derelict in its responsibility to protect the public interest if it were to try to proceed with the proposed lease sale on its basis. Virtually all of the important deficiencies in the DES cannot be compensated for on the basis of presently available scientific information. A substantial program of focussed research in many areas of the life sciences, extending over a period of at least three years, will be required in order to accumulate data adequate to reduce to reasonable size just the major gaps in our understanding of the Southern California OCS region likely to be affected by the proposed development program. On this basis I strongly urge postponement of the lease sale, with concurrent support of suitable research efforts.

I am confident that, following three years of suitably designed research, a more fully adequate DES could be written. On the basis of that DES a far better safeguarded program of oil and gas exploration and development could be undertaken. I must point out, however, that BLM's present plans for baseline research in the OCS are also seriously inadequate.

Inadequate or Incomplete Discussions in the DES

The DES in various places (e.g. sections II E 2-6, III B, III C, III D 6, Appendix 18) points out the high probability that the biological effects of long

term, low level, chronic exposures of marine organisms to petroleum hydrocarbons (PHC s) of various types, also to heavy metals, will turn out to be substantially greater and more deleterious than will the biological effects of large scale, short term events such as well blowouts, pipeline ruptures, or tanker collisions. I agree strongly with this position. The DES falls short, however, in its discussions of what the possible impacts of such chronic exposures might be, also what types of additional studies would be needed to permit informed assessment of these impacts.

An important inadequacy in this context relates to chronic exposures of living organisms to elevated concentrations of heavy metals. Section III D 6, pp. 170-171 of Volume 2, states that there is good evidence that the combined actions of sea water and various microorganisms, in the presence of low levels of pollution by organic matter (such as PHC s), lead to significantly higher rates of corrosion of metallic objects (such as drilling platform supports, pipelines, etc.) than occurs in organically unpolluted sea water. The discussion of these comments is restricted to the probable need to replace worn out metal items more frequently. There is no consideration of this corrosion as a possible significant source of heavy metals going into solution, in addition to the heavy metals likely to be added both from drilling muds and drilling tailings (see Section III B, Volume 2, p. 63). There is no consideration of possible biological impacts of this corrosion.

Related inadequacies are found in Sections III E and III I 5. The biological portions of Section III E on impacts on commercial fisheries considers only possible effects of oil pollution on fisheries yields. There is no discussion of possible effects on these yields of heavy metal pollution, or of possible condemnations of fish catches due to legally unacceptable levels of heavy metals in the tissues of predatory fishes. The same comments apply to the discussion of sport fisheries in Section III I 5.

Still another related inadequacy is found in Section III D 4. The discussion in this section relates to possible effects on marine mammal (primarily pinniped) populations of the Channel Islands of direct exposures of these animals to oil. There is no discussion of possible effects of heavy metal pollution, particularly in the context of contamination by, and biological magnification of tissue concentrations of, heavy metals in the food organisms eaten by these animals. This concern appears to be particularly relevant for the lease areas near Santa Catalina, Santa Barbara and San Miguel Islands.

Numerous brief references are made at various points in the DES (see especially pp. 75 and 85 of Section III C, Section III D 6, and Appendix 18) to the dearth of available scientific research on the effects of low level, chronic exposures of marine animals anywhere to PHC s and heavy metals. With the exception of limited amounts of very recent work, much still in progress, carried out by the Southern California Coastal Water Research Project (SCCWRP), there is virtually no information on these subjects with respect to organisms occurring in the Southern California OCS. Nowhere in the DES is there a discussion of what types of laboratory and field studies would be necessary to provide reasonable amounts of information in these areas within reasonable periods of time, or of possible mitigating measures that could assist in reducing these impacts.

A number of other significant inadequacies exist with respect to additional zoological topics. These include:

The Biological Oceanography sections of Volume 1 (Section II E and its subsections) are uniformly broad scale, historically based, synoptic descriptions of the most abundant kinds of animals, their main habitats, their distributions, and their numbers. Only a fraction of this material relates directly to the

potential OCS lease areas. There is also very little discussion (in many subsections no discussion) of changes in these features with time--either seasonally or over periods of years. There are no discussions of temporal trends on a finer scaled, subregional areal basis. These descriptive sections are, therefore, inadequate in these respects.

Some of these sections are also incomplete. For example, Section II E 4 presents detailed data on benthic fish abundances and distributions based upon recent SCCWRP trawling surveys. The DES recognizes the fact that these surveys have been restricted to relatively near shore, relatively shallow depth, relatively smooth bottom areas. As a result, the DES presents no information on fish populations in further offshore, deeper water, or rough bottom regions.

These sections are further inadequate in that there are only fragmentary discussions in a few places of the dynamics of the animal species considered. Under the term dynamics I include such features as food web relationships, (which species eat which other species, when, where, and how often), population dynamics, species responses to variations in the oceanic climate, reproductive seasons and capacities, competitive interactions with other species, etc. Understanding of the dynamics of at least the major animal populations and associations present in the region is essential if adequately informed scenarios are to be developed concerning the possible effects on the living populations of the OCS of events of the kinds likely to be associated with oil and gas development.

Much of the limited information presented on these topics relates to nektonic animals, primarily fishes (Section II E 4). Table II-55 lists all fish families known to occur in Southern California waters, and gives sketchy general statements concerning their habitats and, for many families, their

major types of foods. The food data are seriously inadequate and incomplete. Out of a total of 150 families listed, 40 have no food information given at all. Some of these blanks relate to some of the best studied, most important (in terms of fisheries and position in marine food webs) fish families--including the salmons and their relations (Salmonidae), the smelts (Osmeridae) and the halfbeaks (Hemiramphidae). These gaps are indications of a lack of expertise on the part of the preparers of this Table.

Other inadequate sections, due primarily to incompleteness of the discussions presented, are Sections II G 5f on shell fish resources and II G 5h on mariculture. These two sections may be compared with Section II G 3d, on sport fisheries. The sport fishery discussion is a careful and thorough one.

Omissions from the DES

There are also a number of important omissions from the DES. A major omission (from Sections III B and III C) relates to possible impacts on the faunas of the deeper water regions of the Southern California OCS. Comments in these sections are restricted to either shallow water or shore faunas. Since the DES explicitly states (Section VIII A 2, Vol. 2, pp. 442-443) that the technology is now available for drilling in water depths greater than 1000 feet, and that this technology will almost certainly be used off Southern California, there is need for such a discussion.

The faunas of the mesopelagic, benthopelagic, and deep water benthic regions of the Southern California OCS are highly varied, form important parts of the oceanic food web (especially, in terms of relationships to shallow water fishery resources, the vertically migratory "deep scattering layer" mesopelagic associations), and are adapted for life in some of the least polluted water masses in the oceans. Even low level, chronic exposures to PHC s or heavy metals in this environment are likely to have drastic effects on viability,

growth, mobility, reproduction capacity, capacity to compete with other species, etc. of many of the most abundant animals in these faunas.

The fact that oil floats does not mean that these faunas will not be significantly exposed to PHC s from deep water leakages. The DES repeatedly points out that many of the lower molecular weight, more volatile, for some compounds more carcinogenic, components of crude oil are significantly soluble in sea water. Oil leaking into sea water also tends to emulsify to considerable degrees, and microscopic emulsified droplets will be widely spread throughout the water column as larger droplets float upward.

An important possible source of heavy metals in these deep water regions could be the bacterially facilitated metal corrosion mentioned earlier (pp. 170-171, Volume 2 of the DES). This would be in addition to heavy metals deriving from drilling muds and tailings spread on the deep sea floor around wellheads.

A second group of significant omissions is in the area of possible second order effects of environmental impacts of the OCS development program. There are several sections in which such discussions are needed (including Sections III B, III C, III D, and III E, Volume 2). I will discuss here, as an illustration, what I consider to be the most serious of these omissions.

Section III C 3, Volume 2, states that a possible, perhaps quite probable, effect of the OCS program could be the total elimination from the region of the large breeding colonies of pinniped marine mammals on the Channel Islands. There is no discussion of possible implications of such a disastrous development.

I can visualize at least two major, second order implications. First, a substantial, highly vocal, politically potent public outcry against the OCS program on this ground alone. There is a very high level of public interest in and concern for the welfare of marine mammals in the Southern California

human population. Second, a possibly highly significant, probably deleterious, effect on the regional populations of many species of bony fishes and shellfish and crustaceans important in both sport and commercial fisheries.

The marine mammals involved form one of the largest groups of predators now feeding upon the regional populations of the other organisms mentioned. Removal of these predators would probably have, as a short term result, explosions in the prey populations. These might be temporarily advantageous to fishermen, but would be likely to be soon followed by serious declines in both size and quality of the fisheries animals. Predators perform ecologically essential roles in removing sick and otherwise debilitated animals from living populations. They also are often essential in ensuring that prey population sizes do not exceed the support capacities for the environment of the prey. Predator removal frequently results in both serious overpopulation of prey organisms, with resultant stunting of growth due to inadequate food supplies, and to significant increases in the occurrence of diseased, deformed, or otherwise unhealthy prey organisms. Significant reductions in the populations of predatory marine mammals (such as sea lions and fur seals) could, thus, have far reaching damaging effects.

Finally, another significant omission from the DES relates to the commercial fisheries of Southern California. Section II G 3d, Volume 1, is a good, current description of the past and present status of Southern California sport fisheries. This section includes some data on commercial fisheries as well. However, there is no separate, specific discussion of commercial fisheries (worth many millions of dollars per year) comparable to that for sport fisheries.

IV MARINE BIOLOGY

CRITIQUE OF THE DRAFT E.I.S. FOR SOUTHERN CALIFORNIA O.C.S. LEASING AS IT RELATES TO IMPACT UPON MARINE LIFE

by

Dr. J. T. Enright, Professor
Scripps Institute of Oceanography

I

MASSIVE OIL SPILLS

The only information presented which is directly relevant to the question of the effects of massive spills on plankton is the statement that Oguri and Kantor (1971) found "no conclusive evidence" of an effect of the Santa Barbara spill on phytoplankton community productivity "directly attributable to the oil spill". Such a stringently and carefully qualified negative conclusion, based on a single study, should not, however, be interpreted to mean that a massive spill will be harmless to the plankton.

On the basis of less direct evidence, derived from controlled experiments, it has been concluded that oil in concentrations as low as .001 ppm (parts per million) may inhibit algal cell divisions, and that 50-100 ppm will inhibit photosynthesis (p. 68). Evidence cited in another section of the Draft Statement indicates a possible discrepancy in this latter figure. Based on the same reference (Gordon and Proust, 1972, which is not available to me), a direct quotation is given which indicates that photosynthesis is inhibited by crude oil concentrations of 50 to 100 ug/l, or .05 to 0.1 ppm (p. 113). One or the other of these citations is wrong by a matter of one thousandfold. Other laboratory evidence shows that zooplankton may be sensitive to concentrations as low as 1 ppm (p. 73); and that behavioral and reproductive functioning of marine fish and crustaceans may be disrupted by concentrations of certain constituents of crude oil at levels of 0.01 to 0.1 ppm (p. 85).

There is, then, every reason to presume that a massive spill will have negative effects on both zooplankton and phytoplankton in any area upon which a massive spill impinges, but no reliable basis for assessing how negative the effects will be, nor how long such effects will persist after the spill has dissipated as a visible entity in the form of surface slicks. The estimates of volume and frequency of massive spills represent educated guesses, based upon the assumption of reasonably "good luck". I am not qualified to offer an opinion about how reliable these estimates are. For the impact of such a spill on the plankton, however, not even an educated guess is possible, since there is no adequate foundation of data from which the "education" might follow. One cannot, of course, conclude that 10^5 bbl of oil would produce a concentration of 1 ppm in 10^{11} bbl of seawater; but when one looks for an alternative interpretation, there seem to be no data available on the expected areal, volume or temporal extent of any particular concentration of oil or its constituents in seawater due to a massive spill.

From this wellspring of admitted ignorance and uncertainty, the optimistic conclusion is drawn (p. 75), "The literature indicates that the plankton population of the Southern California ecosystem will probably be able to absorb the impact of a major spill and recover fairly rapidly". The sole supporting evidence from which this optimism derives seems to be the statement on page 74 (which is not attributed to any other source), "However, based on the high reproductive potential and numbers of larvae released by these animals, distributional and survival powers [sic] will not be significantly

affected although there might be a locally adverse effect". This is not, I believe, a conclusion derived from the literature, but only a pious hope. It may be so, or it may not be so, but evidence in either direction is lacking.

II

MINOR SPILLS

The Draft Statement is disarmingly frank in admitting that there has been virtually no prior careful study of the effects of low-level continuous spillage of oil in offshore water. Regular natural seepage in the California borderland is estimated at 100 bbl per day; I can see no justification, however, for accepting the following inference: "The fact that the area [where the seepage occurs] is highly productive may indicate no long term effect on the plankton." The extent to which productivity of plankton might be greater and the environment healthier in the absence of this seepage is totally unknown.

Two series of quotations about the effects of minor spills and prolonged chronic discharge of oil, based on "cautious speculation", are offered in the Draft Statement. First, a "pessimistic view" (p. 70) ". . . we are rather ignorant of long-term effects", followed by a consideration of several suspected negative consequences which cannot at present be proven, disproven or quantified; then, a "less pessimistic view" (p. 71): "Chronic pollution from offshore production sites represents an unknown factor," followed by the optimistic suspicion that the "immensity of the water column"

may dilute expected negative effects, provided there is no cumulation of toxic substances--which latter possibility is also stated to be an "unknown factor."

In this critical problem area, therefore, the conclusion drawn (p. 75) seems to me to be entirely appropriate: the impacts of sublethal [and, I would add, even lethal] effects, as well as carcinogenic and food-chain-uptake effects of chronic discharge are recognized as "potentially dangerous", but how dangerous, either to the total marine ecosystem, or to man (through fisheries activities) ". . . is still in the unknown category". With this depth of admitted ignorance, is it possible to make an informed decision about environmental consequences of the proposed lease?

III

FORMATION WATER

In my opinion, the two most critical failings of this section of the Draft Statement are that it does not even consider formation water as an important source of contamination by oil and other petroleum products; and that no consideration is given to the long-range fate of formation water. A quotation from the MIT Offshore Oil Task Group (1973) is offered on p. 6, ". . . biologically this low-concentration, persistent source [i.e., formation water] could be the most significant of all minor discharges", and this statement is nowhere subsequently refuted. Nevertheless, the treatment of formation water on p. 72 essentially ignores the fact that it will be an important source of contamination of the oceans by oil, passing

over the issue with the statement that the water ". . . has all but traces of entrained oil removed". In fact, "OCS operating orders require that the average oil content at the point of discharge must not average more than 50 ppm" (p. 6), but 50 ppm, multiplied by the volume of formation water to be discharged, indicates a continuing discharge into the ocean of upward of 100 bbl of oil per day (p. 87). That calculation assumes a 40-year life for the project; should improved technology accelerate the rate of daily production of oil, leading to a shorter total production interval, the daily amount of oil in formation water might well be even greater. Even at 100 bbl per day, that amount of oil in formation water might well be even greater. Even at 100 bbl per day, that amount of oil is greater by a factor of about 4 than the expected total of all small spills and other chronic discharges, and greater by a factor of 3 than the (averaged) annual oil input expected from massive spills; it is overwhelmingly the largest expected source of oil to be released into the marine ecosystem. Hence, the introductory paragraphs on "Impact on Biota of the Open Bight Region (p. 66), where formation water is not even mentioned, represent a disconcerting misplacement of emphasis: "It must be recognized at the outset that oil spills probably represent the most severe threat to the biota. . ." (p. 66). If estimated volumes of contamination due to spills are realistic, they dwindle to relative insignificance, in terms of probable biological impact, compared with the oil which is to be added to the ecosystem in the discharged formation water.

Furthermore, it is my interpretation--perhaps mistaken, but I have found nothing in the Draft Statement to refute that interpretation--that the allowed 50 ppm represents oil and grease, recognizable as such, and may well not include those components of crude oil which are dissolved completely in the brines, such as aromatic hydrocarbons. The MIT Task Group has observed (p. 6) that "there appears to be no data on the fractional composition of the oil remaining in the water after treatment, " but notes that the separation process is ineffective against dissolved constituents. There are two small bits of data presented in the Draft Statement on this subject, contained in Table III-3. It is indicated there that the single sample of water--which, incidentally, seems exceptional in that it contained remarkably little oil and grease (5 ppm, vs. 50 ppm allowable), and remarkably little salt (about 2/3 that which is given in Table III-2 as a "low solids" brine)--also contained 2.1 ppm of phenol (C_6H_5OH). Phenol represents only one of a vast array of readily soluble hydrocarbon constituents of crude oil, and apparently no detailed analysis for other such hydrocarbon constituents was undertaken.

That same Table (III-3) indicates that the water tested contained 1810 ppm "volatile solids". I consider it extremely important to know what those volatile solids were, and what their concentration in more typical formation water might be. The possibility exists, I think, that these represent the host of other soluble constituents of crude oil. If that is so--or even if an appreciable fraction of those volatiles constitute soluble aromatics--their concentration in formation water would be so high as to constitute not only grounds for environmental concern, but a basis for extreme alarm. Perhaps

there is a simpler and innocuous alternative explanation for 1,810 ppm "volatile solids", but none has occurred to me. The biological consequences of such a concentration of dissolved aromatics--if that is indeed what they are--can be expected to be catastrophic. The vast majority of such soluble hydrocarbons are biologically harmful, including, of course, phenol: "a caustic poisonous crystalline acidic compound. . . that in dilute solution is used as a disinfectant" (Webster's Collegiate Dictionary). Many such compounds are extremely toxic even in low concentrations, others being carcinogenic. The Draft Statement indicates, for example, that soluble aromatic derivatives of crude oil at concentrations of .01 to 0.1 ppm will disrupt feeding, reproduction and social behavior of fish and lobsters (p. 85); there is no obvious reason to expect plankton to be less sensitive. Phytoplankton cell division can be inhibited by oil concentrations as low as .001 ppm (p. 72) and photosynthesis is inhibited by oil concentrations of .05 to 0.1 ppm (p. 11e)--actions which I suspect may also be due primarily to soluble aromatics.

It is my considered opinion, therefore, that our ignorance about the identity and concentrations of these solubles in formation water is an extremely important gap in our knowledge. Why has the 1973 plea for such information by the MIT Task group (p. 6) not been answered by careful accumulation and publication of relevant data?

Another truly critical question which is not addressed in this section of the Draft Statement is the following: what will be the ultimate fate of formation water and its contaminants? On this subject, the Draft Statement seems to me to be extremely naive (p. 72): "It could be anticipated that the release of this water would result in a plume trailing away from the point of discharge

in the direction of the current, with a core perhaps a few feet in diameter and tens of feet in length". Regardless of the temperature at which this water is discharged, the expected salt concentration (suggested by Table III-2, although "no valid information exists for mineral salt concentrations from oil field brines in Pacific OCS waters." [p. 3]) is so high that I believe, in the absence of better information, that one must presume such water would sink rapidly; its density would very greatly exceed that of the surface waters. During the sinking process, it would no doubt be diluted by the surrounding waters, but the extent of such dilution and the resulting final density cannot be accurately determined on theoretical grounds. Perhaps these formation waters would sink as a relatively coherent plume, to be layered on the bottom; perhaps, with sufficient turbulence, they might mix extensively with the water column; but to assume that they will disperse as a plume subject primarily to surface currents seems to me to ignore elementary physical principles.

Because of the expected short residence time of very dense formation water at the surface of the ocean, it can be expected to remain essentially anoxic, except for advected oxygen from the dilution with surrounding waters--which nevertheless represents a net loss of oxygen to the system. Without adequate information about the extent of dilution, one cannot determine the salinity of the resulting mix, but the salt will not disappear. The result may, then, be an accumulating layer of essentially anoxic, highly saline brine with an oil content of 50 ppm and an unknown amount of soluble aromatics, on the bottom surrounding the production platforms

(2 million bbl of such water per day), or an accumulation of a much larger volume of more dilute saline water, with a salinity perhaps only moderately greater than that in the general area, a modest depletion in oxygen, and concentrations of oil and soluble aromatics which are less than at the point of discharge, how much less depending upon the dilution factor. The very great density of this brine, even granting extensive dilution, leads me to suspect that it will in fact remain a relatively coherent body of water on the bottom for very long periods of time. As an example of such coherence, the Mediterranean Sea has deep water with a salinity of about 38.5 ppt, and this water flows into the Atlantic on the bottom through the Strait of Gibraltar and remains a coherent, recognizable water-mass layer in the mid-Atlantic at least 1000 miles from the Strait, although it differs from the surface water in salinity by only the ratio of 38.5 ppt to 35 ppt. For comparison, the salt content of formation water given in Table III-2 is expected to perhaps be on the order of 100 ppt to 150 ppt, compared with 33 ppt for the surrounding receiving waters.

As an example of the kind of speculative calculation that can be made, based on major ignorance about the expected fate of formation waters, let us assume a 10:1 dilution of formation water en route to the ocean bottom; and let us assume that this dilute mixture would then flow outward from the sources along the bottom, to produce a layer of, say, one meter thickness. Taking 2.5×10^{10} bbl of formation water as the total produced over the life of the project, or 3×10^9 cubic meters, leading to 3×10^{10} cubic

meters of the 10:1 dilution, the area covered would be $30,000 \text{ km}^2$ or about 10,000 square miles, covered to a depth of one meter. This is, of course, a cumulative calculation over the life of the project; since there is no evident biological or physical mechanism which would remove salt from the system, other than gradual flow of the high-density mixture to greater depths, a cumulative calculation seems appropriate to me.

With the assumed 10:1 dilution, the oxygen deficit might not be an appreciable problem for the biota in and beneath this layer, but the salinity of the mix would be about 20% higher than ordinary seawater--probably an intolerable osmotic stress for many if not most offshore benthic and near-bottom organisms. The oil concentration would be reduced to 5 ppm due to dilution, and the concentrations of soluble aromatics would also be reduced to 10% of their initial level, whatever that may be. The long-term fate of these hydrocarbons, including the extent of their persistence over time, are matters about which I will not even offer a guess, but it should be borne in mind that biologically deleterious concentrations of aromatics can be at least as low as 0.01 ppm (p. 85). It seems likely, therefore, that even a 10:1 dilution of formation water would constitute something other than a biologically optimal environment. Is it conceivable, then, that this proposed lease sale would lead to the sterilization of 10,000 square miles of seafloor? That is admittedly a pessimistic scenario, but I see nothing in the Draft Statement which precludes such a possibility; nor does this sort of pessimistic speculation obviously violate any physical or biological principles.

IV

SUMMARY

In brief summary of these considerations, it appears to me that the information in the Draft Statement is completely inadequate to evaluate the ecological implications of the proposed lease. There is clear reason to recognize that environmental deterioration will be inevitable, but the extent of the deterioration cannot be legitimately assessed.

Major spills can be expected, with a high degree of confidence, to cause decreases in photosynthesis by phytoplankton, and produce death as well as assorted sub-lethal abnormalities in huge populations of zooplankton. Inadequate information is available to determine how long such effects would persist, over how large an area. One can hope that the flora and fauna would recover rapidly, but there is no good empirical basis for assuming that this will occur. The expected dissipation of surface slicks, within 60 days of a massive spill, does not mean that residual negative consequences might not persist much longer in the contaminated waters.

Minor spills and chronic low-level discharge can be expected to have qualitatively similar but continuous negative effects on the planktonic flora and fauna. Concentrations of oil as low as 0.05 ppm have been shown to inhibit algal photo-synthesis, and concentrations as low as 0.01 ppm have affected behavior and reproduction of marine animals. Hence, even low-level discharges may have persistent adverse consequences, but the real extent and magnitude of these

consequences cannot be quantitatively assessed. The Draft Statement is accurate in concluding that such effects are "unknown", potentially dangerous" and possibly "the most severe effects of oil production in the marine environment".

The discussion of formation water in the Draft Statement in terms of biological and environmental consequences is both superficial and grossly oversimplified. At a permissible level of 50 ppm oil residue in the water at the point of discharge, this source will apparently represent the overwhelmingly dominant source of environmental contamination by oil--not in a form in which it will be a visible nuisance, but as a hidden, diffuse and probably lethal source, the consequences of which will be felt by the surrounding ecosystem. The first important gap in our understanding of this problem is that the nature and concentrations of the various petroleum derivatives in formation water at the time of discharge are apparently unknown. Since the separation process is ineffective against soluble constituents, the water will contain unknown but probably deleterious concentrations of a huge array of soluble constituents, particular aromatics, the action of which may be expected to be adverse upon the biota even in very low concentrations. The magnitude of this problem cannot be assessed, but it is potentially acute.

The second important unknown with regard to formation water is the nature of its ultimate fate in the ecosystem. The expectation of high salt concentrations means that this water can be expected to sink through the water column, be subject to some unknown dilution factor en route, and thereafter form a dense layer on the seafloor, which will disperse due to gravity flow. The depth, areal extent, persistence and biological unfavorableness

of this layer cannot be accurately predicted; the Draft Statement does not even consider this problem so far as I have been able to determine.

V MARINE BOTONY

REPORT ON DRAFT ENVIRONMENTAL STATEMENT

DES-75-8 - OCS Sale No. 35

Bureau of Land Management

by

David J. Chapman, Associate Professor Biology

University of California, Los Angeles

I

SCIENTIFIC ACCURACY

The strictly descriptive aspects (Vol. 1 and appendix Vol. 3) pertaining to the phytoplankton and attached vegetation are essentially correct. The descriptions are basically condensates of the available literature of this century, but with no critical evaluation. Even then some errors have crept in. Euglenoids and Chlorophyta (1, 99) are not principal constituents of marine phytoplankton. Cryptomonad phytoplankton, which are unmentioned are probably equally important as the above two groups. This DES should point out that these descriptions are only qualitative. There is no distinction as to relative importance of various groups of organisms, and significantly no quantification of contribution to the food chain. This information is probably not available except in rudimentary form. This is information that is sorely needed before any impacts are felt. I would also have expected the discussion to have mentioned the end effects (eg. anoxia, fish kills) of phytoplankton blooms.

The description of the benthos is also essentially correct. The implication (1, 144) that the impending "Marine Algae of California" will provide, or meet, baseline requirements for environmental studies is erroneous. Floristic studies are qualitative and cover only selected sites. They do not cover the entire area and are not quantitative except in the broad sense of "abundant, sparse, common, rare" etc.

What we need - unquestionably so - is a quantitative baseline for the entire area for all algae and maritime vegetation for all seasons.

This information will take time to assemble; two to three years. Without it, it will be impossible to monitor changes and impacts, except in a qualitative sense. This discussion is superficial, since the important data is the quantitative information. A major deficiency of this DES is the failure to distinguish between the qualitative and quantitative and to emphasize the latter. Much of the quantitative data that are available are concerned with very localized, specific instances, e.g., sewage out-falls. Equally important are the type of quantitative data. Species numbers, phytoplankton volume are important indicators, but this report should have mentioned productivity. This is the key quantitative datum and the one most lacking. In a review of DES 74-90 the lack of, and need for, quantitative baseline data was discussed. I must emphasize very emphatically, the need for this information, before any potential impacts are felt. We cannot satisfactorily monitor impacts without this data. We are dealing now with much larger areas; 1.5×10^6 acres and offshore areas up to 750 metres depth.

The physiological descriptions, such as they are, are adequate. However, this report is weak in that all available information, appropriate to this problem should have been considered, but only that information immediately applicable is emphasized. Since much of this DES is abstracted from reports and summaries, it is doubtful if this has been done. Such gathering and consideration of information takes time, but site-specific DES of this type should be thorough and complete not cursory surveys, abstracted from other summaries and surveys. While

considerations of what has occurred are important it is equally significant to consider maximal and minimal changes and effects that might occur. Obviously much of this can't be done, simply because there is a paucity of information. In some areas however some discussion of projections should have been included e.g., what changes and increases in sewage effluents are likely to occur in the lease area in the next 20 - 25 years. These changes will affect the environment, and will interact with impacts resulting from the proposed lease. There should have been mention of possible interactions between OCS lease impacts and thermal waters from potential nuclear power stations. If a lack of data prevents adequate discussion, the DES should have said so and pointed this out as an area for immediate work. This DES is deficient in considering such interactions with non-OCS lease effects over the next 25 years, and adds to the inadequacy of this DES. In the marine environment one cannot compartmentalize environmental impacts of OCS-lease and non-OCS lease situations.

The red tide problem is a major concern in Southern California. The discussion (1, 122) on causative agents is superficial. The statement "we do not have evidence to indicate that an occurrence will be caused as a result of the proposed sale and subsequent operation" is a cop out. The appropriate statement is that we do not know what will happen because we know very little about red tide causes. These obviously are a complex interaction between a number of factors such as migrations, steep, shallow thermoclines, nitrates, upwelling. The statement "we do not have evidence" may well be misinterpreted to read "work to date indicates that we do not . . ." These two statements have different meanings and this DES routinely fails to distinguish between "lack of evidence due to failure to perform the

appropriate experiments" and "lack of evidence due to the accumulation of negative results from appropriately performed experiments." Nearly all of the deficiencies in knowledge fall into the former category. In view of the potential impacts of red tides, this DES is deficient in not emphasizing our lack of knowledge of this phenomenon and the urgent need for information before OCS - derived impacts can occur.

Vol. 1, page 11 indicates seawater iron up to 50ng/litre. Vol. 2, page 72 indicates formation waters up to 1000-2000ng/litre (1-2mgm/L) iron. The Table (2, 5) indicates Louisiana brines can have up to 150mgm/L iron. There is obvious potential for sharply increased, if some localized, iron concentration. If we do not know what is in Pacific OCS brine (2, 3) and if we do not know the cause or trigger of California red tides, but if iron has been implicated in red tides elsewhere the statements (2, 73) are inappropriate. This somewhat sloppy and cavalier treatment of red tides represents a further inadequacy of this DES.

The statement (1, 148) that kelp and other algae washed ashore are part of sandy beach vegetation is ridiculous. This is wrack and not part of the natural vegetation.

The actual values of productivity on the intertidal can be accepted, (1, 153) provided the difficulties of measurements, generalizations and sources of error are realized. These results apply to sewage outfalls, and are not necessarily applicable to oil pollution. Sewage pollution, by and large, involves metabolic, or metabolisable, substrates, e.g., inorganic and organic phosphorus and nitrogen compounds. What are needed, and are not mentioned, are studies yielding data on oil effects on productivity, with and without combination of sewage effluent. In considering this productivity data the DES fails to mention that Littler

and Murray (Mar. Biol. 27: 131) commented, "There is considerable risk in extrapolating short term productivity rates to daily rates or yearly rates." I do not believe this is a deliberate omission but rather the result of relying upon other reports and surveys. A further inadequacy (also see later) of this DES is the apparent failure to consult, or consider, the original publications. Such an omission may well result in an expression of only half the story or the incorporation, even if unintentional, of an additional bias.

The descriptive aspects relating to marshes, bays and estuaries are good. The physiological description pertaining to zonation (page 1, 392ff) is not so good. Rarely is zonation so simply dependent upon CO₂ limitation and water logged soils as implied. They may be significant contributing factors. What is more important, and which should have been emphasized is the fragile nature of these environments, and the great susceptibility to damage if the vegetation is damaged,

The discussion on kelp beds (1, 440) and mariculture (1, 663) are adequate. I would have expected a consideration of the impact of oil pollution on any future mariculture operations. It is quite within the realm of possibility that there will be expanded kelp beds and extensive mariculture operations within the next 20 years. What would be the effect of pollution on these operations. Aside from the scientific impact there is also the commercial impact. Even in the absence of hard facts or projections these problems should have been raised. An impact statement should concern itself with the future, and not just with the future trends of the currently existing status, but also with major new developments such as mariculture, increased kelp bed development, increased sewage outfall and potential thermal waters from nuclear power

plant cooling. As these increase and develop, the chance of a deleterious impact increases, with increased potential for environmental and commercial damage.

II

DEFICIENCIES IN KNOWLEDGE

Considerable data are given on total oil spills (numbers, barrels, etc.). These are important data, but I do feel that data should have been readily available that would indicate spillage (bbls.) per oil well and distance separating oil wells and number of wells per area. To emphasize this point there are now in Southern California 170 wells producing 1.9×10^6 bbls. annually. It is projected that the OCS lease could result in 650-4975 wells producing 360×10^6 bbls. annually. This is more than an order of magnitude increase, with at least a potential order of magnitude increase in chance of spills or total spillage. In reviewing this DES, I sometimes get the impression that these considerations have been omitted, or buried in the statement in order to make their recovery difficult.

The statements with regard to the Santa Barbara oil spill are very illuminating, and highlight the problem of monitoring fixed well spillage. Estimates on the spillage (2, 10, 20) vary from 18,500 to 750,000 bbls. There is a world of difference between these two values. By the criteria on page 57 the geological survey estimate (18500 bbls.) indicates this is not a major spill. The high estimate would indicate that this is a very major spill.

It can be argued quite strongly then, that the Santa Barbara was not a major spill and that it represents an inappropriate model or baseline for major spills. This confusion casts a wholly different light on this DES, and it is a deficiency of this DES that this problem has not been fully discussed with regard to using the Santa Barbara spill as a model. While on this subject, mention should also be made of the time factor for a spill to reach shore. Estimates for Santa Barbara varied between 1-6 days. All other factors being equal, an oil spill reaching shore in 1 day will cause more damage than the identical spill reaching shore in 6 days. In using data from past spills in impact projections for future spills, one cannot use only total volume as the significant factor for shoreline impacts. There must also be a consideration of the time to reach shore, weather conditions and season. The failure to take full cognizance of this is a further deficiency of this DES.

Admittedly OCS accident frequency may be decreasing since 1968, but frequency is only half the story. Barrels per spills, spills (bbls.) per area, are also of equal concern. Interestingly enough the Table 111-4 shows a marked increase from 1971-1972 in frequency and volume spilt in onshore pipeline facilities, which offsets any reduction in OCS spillage. It is very easy to play the numbers game to suit a particular viewpoint. I detect in this DES a tendency to consider the problems only at the minimal end of the spectrum. This is an impact statement and thus must also consider the problem from the maximal end of the spectrum. The least that can happen, and the most, should be thoroughly aired and discussed, however unpalatable. The failure to do this is a serious shortcoming of this statement.

The problem of oil in the food chain is a very serious one, and has not received satisfactory consideration. On Page 69 (2) there is a

minimal discussion. "Oil" in toto, entering the food chain is not the significant feature. The concern must be for individual compounds. Only one harmful compound (e.g., Carcinogen) needs to enter the food chain, with all the rest being voided, and the damage is done. The failure of this DES to consider the food chain from this viewpoint, and the failure to emphasize our woeful lack of knowledge of a very important feature, represents a further inadequacy of this DES.

To describe (2, 70) Blumer's statement "we are rather ignorant of long term effects" as a "pessimistic view" is very inappropriate. It is simply a statement of a rather obvious fact, and represents a situation that must be clarified before drilling. Blumer's contention that hydrocarbons are taken up into the food chain is in contrast to the DES statement on page 69.

The discussion on brine water effects is inadequate, and again emphasizes our ignorance in this area and exposes the all too familiar, but erroneous idea that the Gulf of Mexico operations are applicable to Southern California. The contents (1, Table 3) and anoxia of brine waters are potentially harmful. These may well produce a minimal effect in Galveston Bay. But Galveston Bay is not offshore Southern California, biologically or environmentally. What about the potential maximal effects? How do these potential maximal discharges compare with Galveston Bay in terms of volume of discharge and rate-efficiency of dispersal? Table 111 - 13 is superficial. Leaving aside questions about their estimates of spill size and frequency, this table is short on considerations of impact effects on productivity, nitrogen fixing phytoplankton (a new area that may well be quite significant), effects of dispersants interaction effects with red tides, sewage outfalls,

thermal waters from nuclear power plants. There is also the possibility of conflicting effects. With our current ignorance, it is possible that brine waters might enhance phytoplankton growth. Advantageous perhaps, but it would also perhaps enhance red tides. This is a hypothetical consideration but it points out a major weakness of this DES. This is the failure to consider the environment as a complete entity of many interactions. It is knowledge of these interactions that we must have before additional variables from OCS leasing and drilling are fed into the system.

I wish the DES had documented, by description with hard evidence, those "other human influences" (2, 111) which they believe "are potentially more detrimental to bay or estuarine organisms" Human influences can be controlled by regulation. Oil spills, as this DES itself states, are an inevitable consequence of leasing and drilling. Damage to plants could approach 100%, and this could be followed by erosion if successive spillage maintained permanent damage. Erosion is very detrimental.

It is misleading (2 113-114) to use St. Anant's opinions as support for the contention that long term exposure has minimal effect. The Gulf of Mexico (productivity $0.15 \text{ gms C/m}^2/\text{day}$) is not Southern California ($0.55 - 1.11 \text{ gms C/m}^2/\text{day}$). Assumptions, predictions or proposals for Southern California must be based on data derived from Southern California. This is a major deficiency, and the apparent reluctance of this DES to acknowledge this represents a major inadequacy of the DES.

Why (2 114) are "the high concentrations of oil in . . . and effects of brine effluent . . . hard to extend to OCS operations." I would think

these are conditions that might arise. On page 113, 45ppm oil is considered a low concentration.

In the discussion (2, 119) of Baker's results on salt marshes, the DES fails to point out that Baker (Environ. Pollut. 4, 222. 1973) commented that there is only "considerable powers of recovery up to four successive oil spillages." Above that number there is considerable long term damage.

This leads into the question of toxicity. Throughout this DES there are comments about types or constituents of oils and their toxicity. Toxicity is relative and there is inadequate discussion of this. It also depends upon concentration or dose, length of exposure, frequency of exposure and possibility of organismic or environmental detoxification. All of these are pertinent to oil spillage, etc., and the cursory treatment rendered is a further inadequacy of the DES.

One could well envisage, from their own statements (2, 120), that estuarine and bay areas could well be permanently destroyed. The DES admits "widespread death and destruction" from a major spill with "biological recovery from one to several years." Their own estimates (and probably minimal) suggest a major spill every 7 to 10 years. This suggests a very good chance of permanent destruction of the biota and effects subsequent to that destruction.

This DES is further inadequate in that it fails to consider the appropriateness of past impacts to the immediate cases under consideration. It states (2, 124), in reference to the Tampico Maru spill and the San Francisco Bay spill, that oil spills do not permanently damage impacted intertidal areas. There is only a limited analogy of instances of one-time oil spills in non-leased, non-drilled areas to spills and permanent seepage in drilling areas. The DES refers to Santa Barbara area seepage

(2, 53ff) and comments that at Coal Oil Point there is no serious pollution damage. DES fails to state, however, (see Environ. Pollut. 2, 115, 1971) that "downstreams" at Campus Point, there is marked tar buildup and that those authors commented, "There is clear indication that a subtle and gradual erosion of this natural resource has begun." There is a tendency in this DES to consider only half the story, and this undoubtedly stems from a failure to consult original literature. This is inexcusable and represents a serious deficiency of this DES and cannot but raise questions about its objectivity.

As a final comment to this section I would mention that this DES has a major weakness in its failure to discuss "damage." It is used as a catch-all phrase, usually implying death or visual damage. It is very important that there be a distinction between that and physiological (non-visual) damage. This represents one of our most serious deficiencies in knowledge. I am referring to damaging effects on photosynthesis, respiration, nitrogen metabolism (including fixation), growth and reproduction. In the long term analysis, especially with regard to the food chain, these are equally important as simple mortality. A few observations have been made (quoted), but, quite simply, we know very little about the physiological effect of oil on algae and phytoplankton. In view of the importance of such information, I would have expected a more thorough discussion.

Much of the data that are used to buttress arguments of minimal damage are based on individual, isolated, non-cumulative effects. What happens when there is a continuous or cumulative effect? I have emphasized before, that this DES shows deficiencies by failure to adequately consider this problem. It is possible (2, 164) that pipeline installation will necessitate a 2 year recovery for a disturbed kelp bed, and

that several years will be needed after an oil spill for recovery of non-kelp organisms (even if the kelp survives). What happens when these two coincide, perhaps in addition to other environmental impacts, and are of a continuing nature?

III

GENERAL COMMENTS

On 2, 49, the DES states, "it remains to be conclusively demonstrated that marine biotic communities generally lack the capacity to absorb the effects of acute oil pollution episodes without sustaining significant permanent damage." This statement implies that everything will be fine. In addition to comments of applicability of other data to this situation, which have already been discussed, I wish to emphasize that the amount of work with this problem has been negligible, and much of what has been done, has been taken from "after the event" observations of isolated instances. When one talks about the "lack of results" or "non-conclusive demonstrations" it is very important to also consider the circumstances, (the experimental how and what), by which these deductions were reached. This DES is deficient in this regard, and shows an inadequacy not expected in a document of this type. The statement, "Possible exceptions are situations where pollution is extremely widespread or of long duration" is an understatement, and in view of the potential for this, I would have expected greater emphasis.

The discussion (2, 50-51) indicated, for a number of reasons, that the Santa Barbara spill wasn't as extensive as it could have been. This, together with an order of magnitude difference in size estimates, suggests that this spill should be regarded as the base minimum for impact.

For these reasons, and others discussed in this review, the statement summary on page 55 is unacceptable. We cannot really predict what will happen in an oil spill simply by referral to Santa Barbara data. Santa Barbara is not the "best to predict". It is only the "best we have" but still a long way short of the "best we need". Summary statements should not imply more than is appropriate, or more than the data suggests.

The DES states (2, 68), "no evidence was found in the literature that spilled oil enters marine food chains" This problem of the food chain has already been considered, but this DES statement gives no indication of how much work was done, whether negative results were obtained during a definitive investigation for results, or whether the investigations were designed specifically to produce positive or negative evidence. This is a somewhat sloppy approach, and the statement should not be interpreted to mean that spilled oil does not enter the food chain.

A similar sloppy misrepresentation occurs on 2, 75 in the statement, "literature indicates that the plankton population of the Southern California ecosystem will probably be able to absorb the impact of a major oil spill and recover fairly rapidly." This doesn't get to a key issue - How much literature is there, how much is based on Southern California investigations, and what were the type and scope of investigations.

IV

OVERALL VIEW OF SCIENTIFIC NEED

Let us assume that OCS leasing and drilling, with the concomitant unavoidable adverse effects (2, 407) will occur. It is obvious that we should know what all these effects will be, qualitatively and

quantitatively, long term and short term, at every level of organisation and impact. Many of these effects will be special or specific to Southern California and cannot necessarily be deduced by analogy from other areas of the world. I am strongly of the opinion that we must have as much information as possible before we start OCS operations. This information must be obtained from investigations and experiments, specifically designed to yield the appropriate data. With this baseline data we have a better chance to predict what will happen under all possible circumstances and design OCS operations accordingly. Without the data we are just asking for trouble.

V

SUMMARY

This Draft Environmental Statement has been reviewed with a view to the applicability of the marine algae, phytoplankton and maritime vegetations. Criticisms and comments apply only to these areas and do not imply similarities in other sections. In brief this DES is deficient in:

- 1) Consideration of interactions of spillage with other environmental impacts as sewage outfalls, thermal waters from nuclear plants.
- 2) Failure to integrate the entire environment. Oil spillage cannot be compartmentalised out, and considered separately. It must be looked at in the concept of the entire environment.
- 3) Failure to fully consider effects on physiological activities, and a weakness in disregarding the difference between these and visual damage or death.

4) Failure to give proper consideration to the problems of brine impacts, impacts on red tides, impacts on mariculture operations, possible impacts of detergents and emulsifiers if they are used.

This DES is weak in that there is minimal consideration of the future - the next 10-20 years. There is far too much of a tendency to equate what has happened in the past with what will happen, qualitatively and quantitatively, in the future.

This DES is inadequate and deficient because there has apparently been only minimal reference to the original literature. The dependence upon other reports and summaries has yielded only half the story, often with important "caveats" omitted.

The DES has failed to consider the extreme range of possible impacts, relying much too much upon minimal impacts as the criteria.

The DES has effectively failed to realize that Southern California is not the Gulf of Mexico, and has failed to add a very necessary cautionary note in extrapolating Gulf of Mexico data to Southern California.

The DES is deficient in failing to emphasize the need for baseline data - How do we effectively monitor impact if we don't fully know or understand the environment being impacted. 2-3 years minimum are needed to obtain this in a concerted effort. Throughout the DES I detect distinct evidence of failure or inability to critically evaluate data, one of the most serious weaknesses of the statement.

Finally an Environmental impact should address itself critically to the impact at all levels and into the future. This statement fails in this regard, and is more an uncritical resumé of what has happened. My considered opinion is that Draft Environmental Statement for OCS sale No. 35 is inadequate, deficient and unacceptable.

77 01439

U.C. BERKELEY LIBRARIES



C123319905

INSTITUTE OF GOVERNMENTAL STUDIES LIBRARY
109 PHILOSOPHY HALL
UNIVERSITY OF CALIFORNIA
BERKELEY, CA 94720

